ured this month —

nstrumentation nd Control

Panel . . . "The Automatic Processing Plant"
atest news on process control . . . page 42

SEPTEMBER 1957

FOR THE MANAGEMENT TEAM

$1.00 the copy

chemical processing

A Putman Publication / EXECUTIVE MAGAZINES FOR INDUSTRY

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Basic Chemicals for American Industry

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

When inquiring check 5457 opposite last page

that's interesting

In the swim

Pool pandemonium has broken loose across the nation. Estimates point to 150,000 home swimming pools by 1959. Sales

"Jones sure had confidence in that completion-date estimate we gave him."

last year, 30,000 units . . . this year's forecast, 45,000. Big factor is steadily decreasing cost — prefabricated sections of polyester resin—glass fiber combination. (*Plastics*, Celanese Corp. of America).

Plastic anchors cut wool shrinkage

Control of wool shrinkage has been obtained in USDA tests by giving wool fibers a plastic anchor. Treatment of fibers with water emulsion of polyamide-epoxy mixture prevents them from consolidating into tightly packed entanglements or felting, the two causes of shrinkage. Treatment is still in laboratory stage. (*Agricultural Research*, US Dept of Agriculture.)

Not fiction but science

An anti-old-age tablet has revitalized an eleven-year-old Seeing Eye dog. The aging German shepherd slimmed down, has better muscle tone and regained so much vigor that his master has difficulty keeping up with him sometimes. Tablet, combining anabolic substances and nutriments, is being distributed through veterinarians.

... Thought-provoking slants on projects and products

Electronic interpreter

First breakthrough toward a universal interpretation of all the world's tongues and a common written language has been made. An electronic computer has been programmed to interpret four foreign languages and automatically type out idiomatic English translations. Semantic-unit formula developed by Peter Toma of California Institute of Technology correctly renders the thought or "sense" behind each foreign phrase.

Atomic cocktail

Alcohol—forty gallons; oleic acid—two pounds; added to soda water at Canada's Chalk River atomic reactor plant was used to solve a tricky cleaning problem. When a uranium fuel rod ruptured and scattered "hot" flakes in a room-size heavy water container this atomic cocktail was used to lift the flakes on bubbles and float them out from multiplicity of tubing lining bottom of the container. (*Witcombings*, Witco Chemical Co.)

Super-strength steel

High-strength steel has been developed by The National Bureau of Standards. This super steel has a tensile strength of 285,000 lb/sq in, with sufficient ductility for structural applications. Formulation is AISI 4340 modified with silicon and titanium. It is made by normal melting and working processes.

Project Skyfire

A means of breaking up electrical storms by cloud seeding, before they set off forest fires, is being studied by the USDA as Project Skyfire. Meteorologists are heavily seeding clouds with silver iodide to inhibit vertical growth that's necessary before lightning occurs. In the West, 49% of forest fires are caused by lightning.

Turn to next page

Seamless fittings with all the plus values...at no extra cost

Your corrosion piping system can be designed better, assembled faster, made light and tight by using *FLOWLINE* fittings, butt-welded to straight-cut pipe. Available from stock through leading distributors. Made in sizes ½" through 12" — Schedules 5S, 10S, 40S, 80S — Stainless Types 304, 304L, 316, 347; Monel, Nickel, Aluminum.

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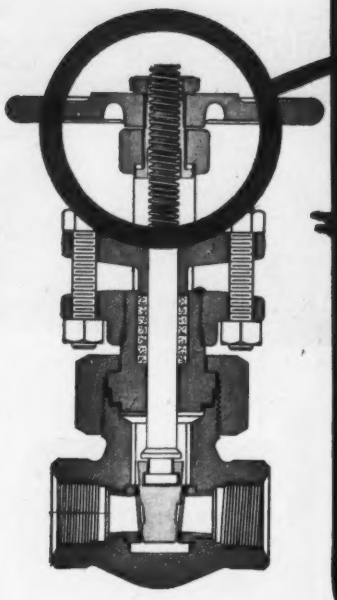

heat and wear resisting

STAINLESS STEEL

Heat and wear-resisting *stainless steel* yoke nuts in Vogt Valves give longer trouble-free service. We have proved this in our own "Torture Chamber," under constant and accelerated testing, as well as in tough service applications. They are made from a special stainless steel alloy having excellent bearing quality, matchless strength, and a melting point of approximately 2700°F.

The rotating gate valve yoke nut design, illustrated, has flats for a tight fit with the square broached hole of the handwheel. Non-rotating yoke nuts, for globe and angle valves, are of the same superior design and quality. Vogt GP Valves are available in a complete range of sizes from 1/4" to 2" and rated 800 pounds at 850°F. and 2000 pounds at 100°F.

Adv. No. 6 in a series describing the features of Vogt GP Valves.

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Vogt GENERAL GP PURPOSE Vogt FOR BETTER VALVES

DROP FORGED STEEL

VALVES

When inquiring check 5459 opposite last page

THAT'S INTERESTING

Dyes from Sand . . .

"I'm going to the beach to pick up some raw material for our silicon dye department.

Silicon dyes developed at Union Carbide Corp. are suitable for dark and permanent coloring of glass cloth. Formerly, glass cloth had to be coated with a substance that could be dyed and at best color was semipermanent and limited to pastels. (*Industrial Research Newsletter*).

Life on Mars?

"The basic stuff of life can endure on Mars . . ." is indicated by experiments performed by Air Force biologists. Bacteria in soil samples held at conditions approximating those found on Mars were able to survive and reproduce. The possibility of intelligent creatures evolving from the bacteria was not considered. (*Denver Post*).

Upgrading cotton

Greatly improved heat and rot resistance has been given to cotton through chemical treatment. This "fully acetylated" cotton heated under tension produces a very strong fabric with little give . . . important where constant length is desired. It is not dissolved by acetone, aniline, or acetic acid.

Stretched for strength

By stretching sheets of polymethyl methacrylate uniformly before forming shapes, tendency to craze and shatter has been reduced. Work done by National Bureau of Standards shows toughness characteristics improved.

chemical processing

with which is combined
CHEMICAL PROCESSING PREVIEW
and Chemical Business

For the management team

Vol. 20 September 1957 No. 9

Published Monthly by

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When inquiring check 5460 opposite last page

chemical processing

highlights

September 1957 volume 20 number 9

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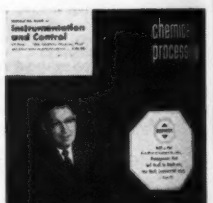
THIS MONTH'S COVER



. . . shows Fred C. Foy, President of Koppers Company, in an informal pose at the company's main offices in Pittsburgh. Super-imposed on the photo is his favorite trademark—the famous Koppers octagon. In the article starting on page 25, Mr. Foy tells what management must do to win the battle for men's minds now going on between management and unions.

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over the editor's shoulder

In case you've wondered?

"Is the automatic processing plant here?" Whether it is—or not—all depends upon your definition of "automatic processing."

To develop a clear, comprehensive statement of present ideas in industry on the automatic processing plant, the CP panel discussion is presented—highlighting the instrumentation and control feature this month.

Moderator of the discussion is John Diebold, internationally-known expert on automatic control problems. Only a few of the top instrument authorities who participated—as Albert Sperry of Panellit, Dr. C. Hurd of IBM, Porter Hart of Dow Chemical Company, James McDonald of Tidewater—can be named here. Turn to page 42 for the others.

Other highlights are articles on successful plant applications of instruments. One tells how Lithium Corporation of America develops accurate temperature profiles on a 250 foot rotating kiln—over the entire length of the kiln. Another describes a device at Davison Chemical Company that reduced thermocouple maintenance . . . by 75%. Another article concerns continuous process control using a flow colorimeter.

Latest instrument developments reported include a continuous process chromatography unit already tested under plant conditions for a year . . . which will continuously analyze at least four stream components. Another concerns a device for measuring and analyzing recorded quantitative chromatographic data—automatically.

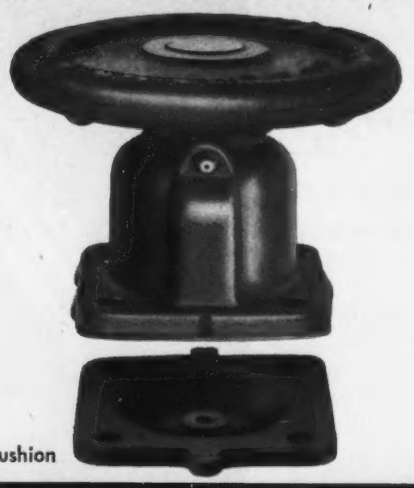
These are only some of the highlights of the Instrumentation and Control Section. It starts on page 41.

William C. Clarke

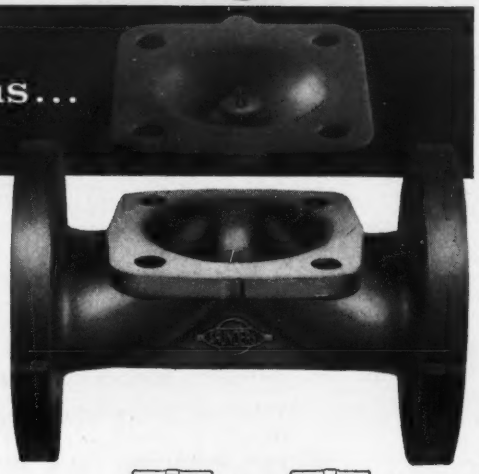
ASSISTANT EDITOR

Outperforms other valves under SEVERE chemical conditions

GRINNELL-SAUNDERS DIAPHRAGM VALVES



with TEFLON Diaphragms...

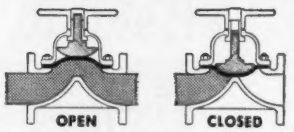


Grinnell Teflon Diaphragms are made by a special process which produces a better product of greater density, toughness and flex life.

The four case histories cited below demonstrate that Teflon offers a very high degree of chemical inertness to some of the most difficult chemicals which industry today must handle. Yet these are only a few of many success stories in the Grinnell files.

Diaphragm life depends on temperature, pressure and frequency of operation. Inquiries must include complete service data to receive prompt and careful attention.

Service Conditions	Saunders Valve	Service Life: Teflon	Service Life: Previous Material
Case 1. Benzene hexachloride (30%-40% benzene, free chlorine); 120 to 130 F, 10 to 20 psi; operated 3 to 4 times daily	Glass lined bodies; Teflon Diaphragm; 1 to 3 inches	10 to 14 mos.	1 to 2 mos.
Case 2. 90%-95% HNO_3 plus 1.8% HF (specific gravity 1.62—1.77) 115 F in summer; 40 F in winter; 125 psi; operated 2 to 3 times daily	Durimet 20 body; Teflon Diaphragm; 1 to 3 inches	8 months	2 months
Case 3. $AlCl_2^+$ complex; ambient to 220 F; 0-50 psi; operated 1 to 2 times daily	Glass lined bodies; Teflon Diaphragms; 1 to 4 inches	9 months	6 months
Case 4. Sulphuric acid 85%; outside temperature; no pressure; operated 4 times daily	Iron bodies; Teflon Diaphragms; 2½ inches	Still in service after 1 year	3 weeks



Features of Grinnell-Saunders Diaphragm Valves

- Diaphragm lifts high for streamline flow in either direction.
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Have safer lines with less maintenance . . .

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The extra margin of safety essential to many process plants where protection of personnel, equipment and product is vital is assured by the bonding of TUFCLAD fiberglass-reinforced plastic to Lapp Chemical Porcelain. Strong fiberglass fabric is impregnated and bonded in multiple layers to the porcelain with an Epoxy resin of high strength and chemical resistance. It cushions accidental blows—acts as an insulator against thermal shock—and because TUFCLAD is so strong and tough, it will hold operating pressures even when porcelain is damaged by accident. Specify Lapp TUFCLAD Chemical Porcelain and enjoy the purity and corrosion resistance of a solid porcelain system with extra security from TUFCLAD armor.

Y-Valves, as shown, and Angle Valves are available in Lapp TUFCLAD Chemical Porcelain in ½", 1", 1½", 2", 3", 4" and 6" sizes. Also safety valves, flush valves, plug cocks, pipe and fittings (to 8" diameter) and special shapes.

WRITE for description and specifications. Lapp Insulator Co., Inc., Process Equipment Division 327 Chestnut St., Le Roy, N. Y.

When inquiring check 5462 opposite last page

conventions and exhibits

September 8-13. American Chemical Society, national meeting, New York.

September 9-13. The Instrument Society of America, 12th Annual Instrument Automation Conf. and Exhibit, Auditorium, Cleveland.

September 10. Synthetic Organic Chemical Manufacturers Association, luncheon meeting, Hotel Roosevelt, New York.

September 11-13. National Petroleum Association, 55th annual meeting, Traymore Hotel, Atlantic City.

September 11-15. Twelfth Annual Instrument-Automation Conf. and Exhibit, Auditorium, Cleveland.

September 15-18. American Institute of Chemical Engineers, meeting, Lord Baltimore Hotel, Baltimore.

September 15-17. Chemical Market Research Association, Annual Resort Meeting, Lake Placid Club, Lake Placid, New York.

September 30-*October* 1. Material Handling Institute, Inc., Joint-Industry Fall meetings, Greenbrier Hotel, White Sulphur Springs, West Virginia.

September 30-*October* 2. American Oil Chemists' Society, meeting, Netherland Plaza Hotel, Cincinnati.

October 6-8. Fluid Controls Inst., meeting, Westchester Country Club, Rye, N. Y.

October 6-10. The Electrochemical Soc., Inc., meeting. Statler Hotel, Buffalo, N. Y.

October 7-9. 1957 National Electronics Conf. 13th Ann. forum on Electronic Research, Development, and Application, Hotel Sherman, Chicago.

October 15-18. Scientific Apparatus Makers Association, midyear meeting of Recorder-Controller Section, Seaview Country Club, Absecon, N. J.

...Meetings and shows of interest to the chemical processing industries

October 17-18. National Conference on Industrial Hydraulics, sponsored by Armour Research Foundation and Illinois Inst. of Tech., Hotel Sherman, Chicago.

October 20-23. Scientific Apparatus Makers Assoc., mid-year meeting of Industrial Instrument Section, Grand Hotel, Point Clear, Ala.

October 21-25. National Metal Exposition, Chicago.

October 21-25. 45th National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago.

October 22. American Society of Safety Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

October 23-24. Computer Applications Symp., sponsored by Armour Research Fdn., Hotel Sherman, Chicago.

October 28-31. The National Industrial Packaging & Handling Exposition, Convention Hall, Atlantic City.

October 28-31. American Nuclear Society, second winter meeting, Henry Hudson Hotel, New York.

October 30-*November* 2. Federation of Paint and Varnish Production Clubs, 35th annual meet., Bellevue Stratford Hotel, Philadelphia.

November 2-8. Second World Metallurgical Congress, spons. by American Society for Metals, International Amphitheatre, Chicago.

November 11-14. American Petroleum Inst. meeting, Conrad Hilton Hotel, Chicago.

November 12-14. National Association of Corrosion Engineers, Northeast Region, fall meeting, Penn-Sheraton Hotel, Pittsburgh.

November 13-14. Air Pollution Conference, co-sponsored by Armour Research Foundation and Midwestern Air Pollution Prevention Association, Chicago.

U.S.I. CHEMICALS goes on-stream with new "Wet Process" Phosphoric Acid Plant using unmodified "spent" sulfuric acid.

Bird-Prayon Tilting Pan Vacuum Filter helps maintain 24 hour per day production without frequent interruptions for filter maintenance.

Here is the Bird-Prayon Filter on the job at Tuscola, Illinois. This plant, designed and built by Singmaster & Breyer using the Prayon Process, achieves significant economies. It utilizes "spent" acid and realizes high P_2O_5 recoveries with the Bird-Prayon Filter which is used in the heart of the process.

How about your Filtration problem?

Whenever you are faced with any of the following conditions, the Bird-Prayon Filter will improve your profit picture.

EFFICIENT WASHING A NECESSITY

Whether your product is the cake or the filtrate, higher washing efficiencies are obtained regardless of quantity of wash liquors employed.

"HARD TO HANDLE" SOLIDS

Rapid settling solids fall on the filter cloth. Abrasive solids fall off when the pans are inverted for discharge.

FILTER CLOTH "BLINDING"

Continuous automatic washing of cloth between cycles removes residual cake and dissolves scale.

COST AND VOLUME OF WASH LIQUOR — CRITICAL

Multiple stage, countercurrent washing will reduce wash liquor requirements to a minimum. Evaporation costs are lower, Circuit dilution is avoided.

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For specific information on individual machines write:

BIRD MACHINE COMPANY
South Walpole, Mass.

Regional Offices:
Evanston, Illinois
Portland, Oregon

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Chempump solves leakage problem

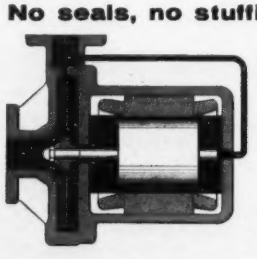
handling carbon tetrachloride at chlorinated products plant

Carbon tetrachloride is tough to handle. It's "slippery", and has a way of oozing through even the best seals and packing. At this major chemical company's chlorinated products plant, conventional centrifugals were used to pump carbon tetrachloride from storage tanks to drums and tank cars. Stuffing box leakage was a persistent problem. Maintenance and downtime costs ran high.

Like many other chemical processors, this company uses *Chempump* to tame hard-to-handle fluids. Since replacement of the conventional centrifugals with two *Chempumps*, leakage has ceased to be a problem. The only maintenance required on the pumps, now well into their second year of service, has been a precautionary change of bearings. External lubrication is eliminated—bearings are constantly lubricated by the pumped fluid itself.

There's a good chance that *Chempump's* many unique advantages can be profitably applied in your own processing operations. For details, write to Chempump Corporation, 1300 East Mermaid Lane, Philadelphia 18, Pa. Engineering representatives in over 30 principal cities in the United States and Canada.

No seals, no stuffing box, no leakage



Chempump combines pump and motor in a single leakproof unit. No shaft sealing device required.

U.L. approved. Available in a wide choice of materials and head-capacity ranges for handling fluids at temperatures to 1000 F. and pressures to 5000 psi.

Chempump

First in the field...process proved

When inquiring check 5464 opposite last page

looking ahead to next month

The other side of the coin

Last month, ESA President Joseph Amann discussed the reasons for unionization of engineers. Next month, John S. Wilson of Heidrick and Struggles, Chicago management counselors, point out some of the disadvantages and problems that engineers encounter if they join unions.

Top management, as well as the technical man, will find much for thought in "Engineers Should Not Join Unions."

Getting the most from research

Industrial research has come of age. Few research directors have the problem of gaining support for their program. They can direct their efforts now toward achieving a hard-hitting, well-managed program that will pay its way and help assure the company's future health.

Vice-presidents Emit Ott and Carl Prutton of Food Machinery and Chemical Corp., discuss today's competitive research picture, tell how to develop a program to keep your company out in front. Read "Implementing a Strong Research Program" in CHEMICAL PROCESSING for October.

Market research — the hard way

Did you ever try to get your market data from a company executive with a .45 on his hip? Well, Roger Williams, president of Roger Williams Technical & Economic Services, has, but this isn't the only adversity he's faced while gathering data on South American markets.

Next month, he tells what the researcher faces in gathering data in foreign lands, and how you can make the most of your trip "South."

...Quick previews of some highlights in October Chemical Processing

Gas Chromatography as a plant tool

While many applications of gas chromatography are in use on a lab basis, practical use of the technique for analyzing plant streams has yet to be made . . . except at Stauffer Chemical.

Engineers at Stauffer's Le Moyne plant adapted a lab unit to monitor *continuously* a stream containing hydrogen sulfide.

In next month's Instrumentation and Control Section, Plant Mgr. E. J. Luerich tells how the unit was adapted and what the results have been.

Bulk storage saves annual $20,000

After working out the major problem — caking — Diamond Crystal Salt has come up with an effective method of handling bulk soda ash in storage. Combination of a mechanized storage unit and bucket elevator allows them to circulate the stored material.

Diamond's shift from bags to bulk has accounted for an annual savings of $20,000 in bulk discounts, and elimination of many handling costs. You'll find a description of Diamond's system in next month's Material Handling section.

The fuel outlook — tomorrow

What is the status of the world's petroleum reserves? Is there any basis for the oft-expressed opinion that we'll soon run out of fuel for our cars or our industries?

One of the top authorities on petroleum reserves, Dr. Lewis G. Weeks, Chief Geologist for Standard Oil (N.J.), gives his appraisal in next month's CHEMICAL PROCESSING.

Preview: His conclusions, well supported by solid evidence, are optimistic.

Mr. Henry Backus
PERSONNEL & SAFETY DIRECTOR
Midwest Abrasive Company
Owosso, Michigan

"Doc! It's like fighting DERMATITIS with an armored glove."

Except WEST *protective gloves* are invisible:
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— easily washed away.

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WEST PROTECTIVE CREAMS protect against hundreds of troublesome industrial irritants. They're antiseptic. Inhibit harmful bacteria with Hexachlorophene. And they protect *for extended periods of time.*

"We've found a simple way to control dermatitis"

"Our men all know how West's Antiseptic Protective Cream #211 guards their hands against abrasive dusts and other potential skin irritants in our plant. Applying this protective cream regularly has become a simple routine with them. As a result, this precaution has virtually eliminated outbreaks of dermatitis," says MR. HENRY BACKUS, Personnel & Safety Director for the Midwest Abrasive Company, Owosso, Michigan.

"We find that West's Antiseptic Protective Cream #211 does not harm or stain clothing and may be used around the year in complete comfort."

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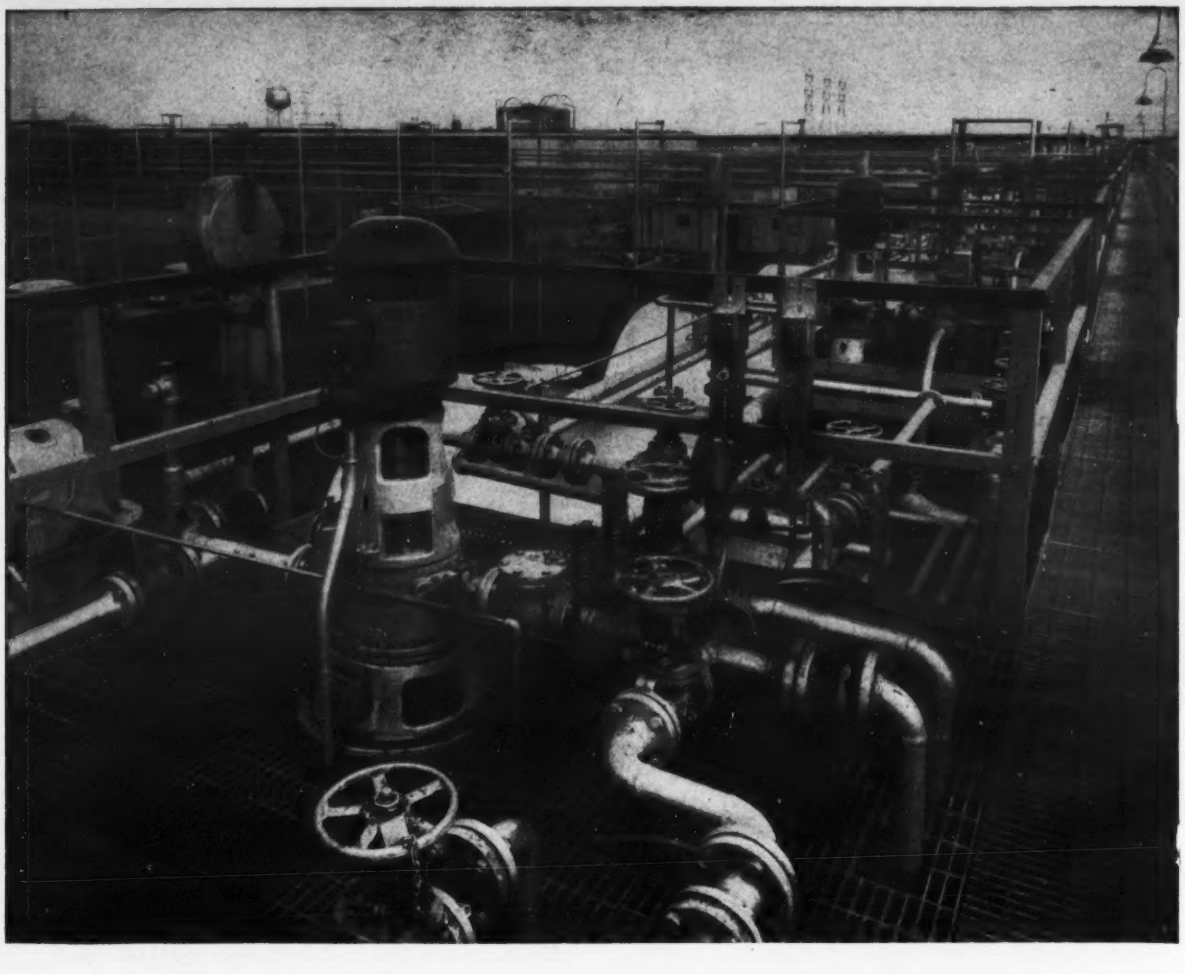

After nine years and thirty million gallons...

This plant of B.F.Goodrich Chemical Company at Avon Lake, Ohio, went into operation in 1948. There were 12 LaBour Type G pumps in the original installation, and by conservative estimate they have pumped something like 30,000,000 gallons of alcohol, plasticizers and blending liquids. All are still on the job 24 hours a day, and total repairs for the lot consist of a few bearing replacements. Since Type G is a packingless pump there has been no packing expense.

When a recent expansion was planned to add materially to the capacity of the plant it was decided not to buy any more pumps. The nine-year-old LaBours had demonstrated such dependability and were in such good condition that they could be trusted to handle the increased responsibility without help.

If you're looking for real economy in pumping, consider this typical LaBour performance record. Difficult jobs and difficult liquids make it even more profitable to assign the task to LaBour. Ask us to prove it.

LABOUR

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A Real Shortage?

Dear Sir:

. . . thank you for publishing the excellent article on "Why a Scientific Manpower Shortage?". This is about the first article that I have seen that points up my own belief that "there is no shortage of chemists — there's a shortage of *cheap* chemists." The smoke that has been thrown up by industry to induce an expansion of the chemical labor market is now being recognized for what it is worth by students.

I believe that it is very cruel to induce people to enter a field for which by temperament, interests, and abilities they are unsuited. . . . Let industry attract men by showing them what it will do for them in the long run!

C. M. MARBERG
Chicago, Illinois

Super Fuels

Dear Sir:

I appreciate very much your report in the June issue of CHEMICAL PROCESSING about our new Gold Crown gasoline and the story behind it.

The introduction of Gold Crown, with its exclusive chemical control for preignition, is not, however, a "reversal of Standard's previous thoughts on phosphorus compounds" as you stated.

Our objection to use of such additive controls in the past was based purely on the matter of need. Studies by our research staff showed that until the current high compression automobile engines were made available, the problem of surface ignition and spark plug fouling that a phosphorus compound can cure was not important enough to be considered.

Our research staff the past five years, cognizant of the fact that eventually higher compression engines would need a chemical control, worked in anticipation of that need. The result is our ex-

clusively developed chemical control to meet the problem most effectively at a time when it is of major importance. That time has arrived, with today's higher compression automobile engines.

DON CAMPBELL
DIRECTOR OF PUBLIC RELATIONS
STANDARD OIL CO. (INDIANA)

The "Good Faith" Bills

Gentlemen:

The explanation offered by Representative Wright Patman in your July issue makes me feel reasurred that federal regulation of business practices is headed in the right direction. As a small manufacturer of chemical specialties, we've been placed in the position of loosing business to the biggies who can "wheel and deal."

Please accept my thanks for making the facts known. My own industry group (the MCA) apparently does not feel that this side of the case should be stated.

(NAME WITHHELD BY REQUEST)
NEWARK, N. J.

Thoughts on inorganics

Dear Sir:

The very timely article by Mr. I. H. Munro in the August issue cites several examples which indicate the revival of interest in inorganic chemistry. Although he naturally stressed the more glamorous examples . . . his conclusion that "the future for inorganic chemicals looks bright" applies equally well in less spectacular fields.

I do not feel, nor do I think the author intended to imply, that organic chemistry is no longer highly important. These recent developments obviously are the result of research in the field of inorganic chemistry and show that it is currently assuming its rightful place as a challenging field for further fruitful research.

RUSSELL BELL
VICTOR CHEMICAL WORKS
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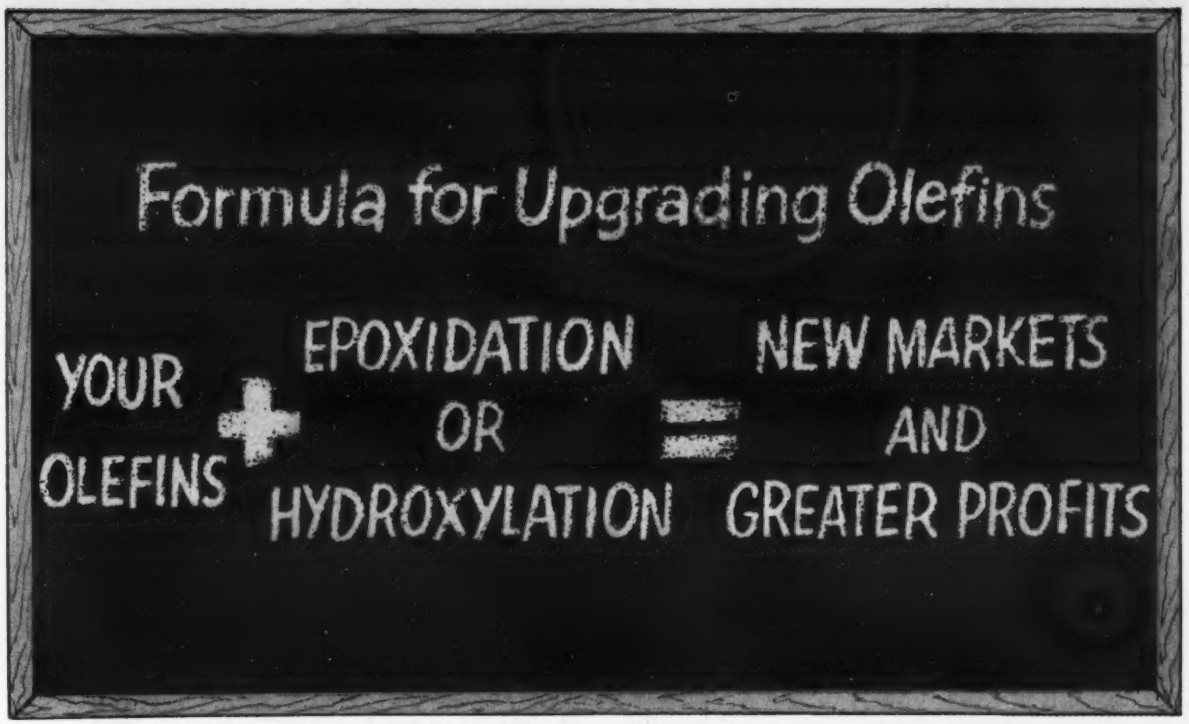

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If you would like to explore the possibilities of upgrading your olefins via epoxidation or hydroxylation, we will be glad to send you a general description and review of these processes along with an up-to-date bibliography of technical data on the subject.

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Please send me without obligation your description and review of the epoxidation-hydroxylation processes and bibliography of technical data.

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NO. 20-A—available in ½" size only— similar to ½" #60, but with low capacity—designed especially for *light condensate loads.*

SERIES 120—same as Series 60 but for higher pressures and temperatures (600 psi, 750° F). Featuring all-stainless steel construction. Six sizes, ½" to 2".

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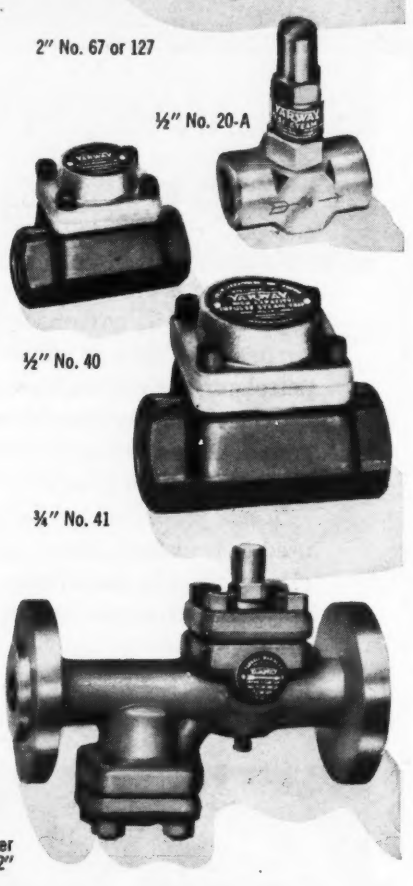

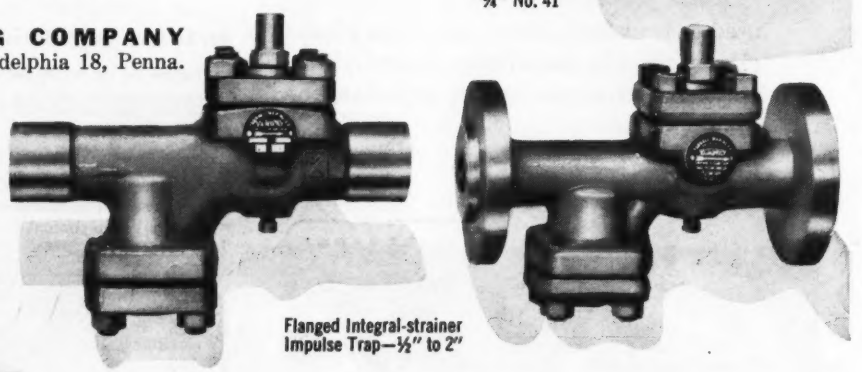

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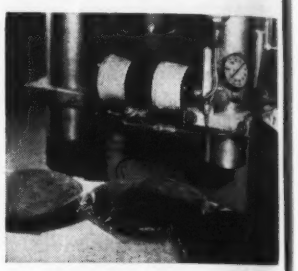
nuclear notes

Irradiated reactor cores

Aerojet General Nucleonics, manufacturer of nuclear reactors, is having its polyethylene reactor cores irradiated with 8-million volt electrons to give them better heat resistance.

After fabrication, the core segments are sent to Applied Radiation Corporation in Walnut Creek, Calif., where they are exposed to high energy



Core segments passing through electron beam of accelerator

linear electron accelerators. Irradiation causes polyethylene to cross-link, increasing its melting point, tensile strength and hardness, and decreasing its solubility.

Reactors for seven nations

As part of President Eisenhower's Atoms-for-Peace program, grants totaling almost two and one-half million dollars have been ok'd by AEC for nuclear reactor research projects in seven nations.

AMF Atomics, Inc., New York will design and fabricate reactors for Japan and Portugal, and General Electric for Venezuela and Spain.

Other firms building reactors for foreign nations are: Babcock and Wilcox for Brazil; Foster-Wheeler Corp. for Denmark; American Car and Foundry Industries, Inc. for the Netherlands.

For more information on product at right, specify 5469 . . . see information request blank opposite last page.

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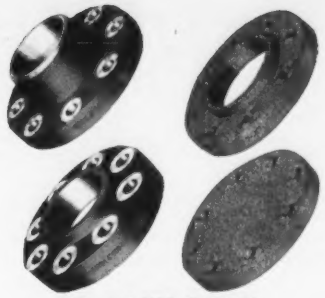

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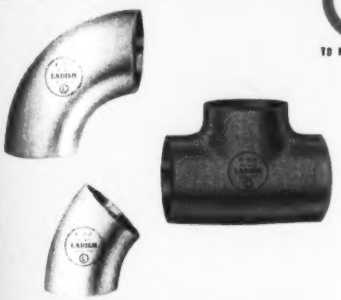

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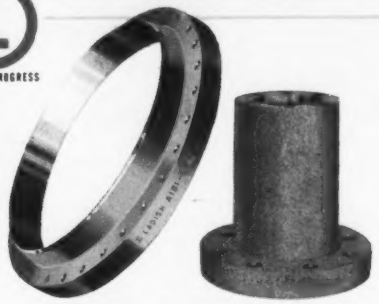

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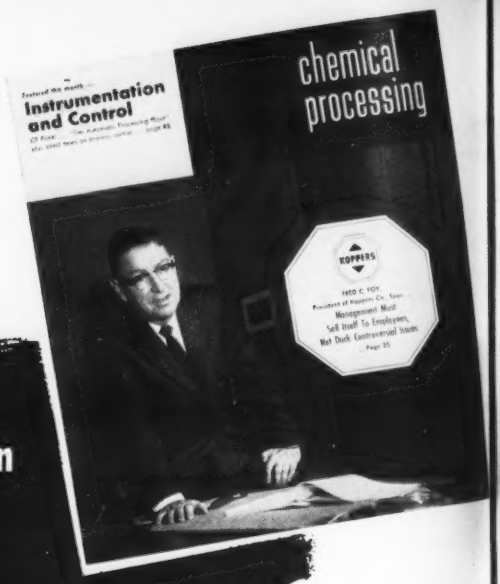

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Why? Maybe, like many others, you've wondered why CHEMICAL PROCESSING comes to you *without charge* — while, perhaps, you pay a subscription price for other business magazines.

Maybe you've thought publishers *make money* when they sell you a $3.00 or a $5.00 subscription.

No — publishers lose money . . . yes, most business magazines lose money when they sell a subscription — not only because the magazine costs more to produce than the subscription price brings in — but also because the cost of making such sales exceeds the income for $3.00 or $5.00 subscriptions.

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For you simply can't get maximum coverage of these important folks by trying to sell subscriptions. These men, limited in numbers, are scattered all over the U.S.A.: travel and/or direct mail cost money; a large share "forget to renew" each year; and, no matter how much time, money and pressure you put on them, there are always some important men who will never buy.

CHEMICAL PROCESSING gets best circulation . . . So, as you can see, to get the best, most effective circulation coverage, the best way is to "hand-pick" the right readers, then send the magazine to them. This gives value to advertisers which can't be gotten in any other way.

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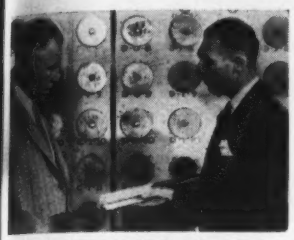
Company will furnish 5000 fuel elements

Sylvania-Corning Nuclear Corporation, Bayside, N. Y., will supply 5000 fuel elements to refuel research reactor at Brookhaven National Labora-



Dr. L. J. Haworth (left), Director of Brookhaven, and Dr. L. L. Davenport, President, Sylvania-Corning, discuss fuel element before loading face of Brookhaven reactor

tory. This is largest number of fuel elements for non-military use ordered on commercial market. About a quarter million dollars are involved in the order.

Go-ahead given for 17 reactors

AEC has issued permits to Aerojet-General Nucleonics of San Ramon, Calif. for construction of 17 low-power research reactors.

NAM announces policy in nuclear energy field

The National Association of Manufacturers has approved policy declarations in respect to civilian nuclear power reactor development and international aspects of peaceful nuclear energy development.

The Association takes the stand that present government-industry set-up with respect to construction of nuclear power reactors is a sound one. Any crash program on construction of industrial reactors would sacrifice quality for quantity development and jeopardize the over-all progress of nuclear development for industrial purposes.

The NAM also feels that

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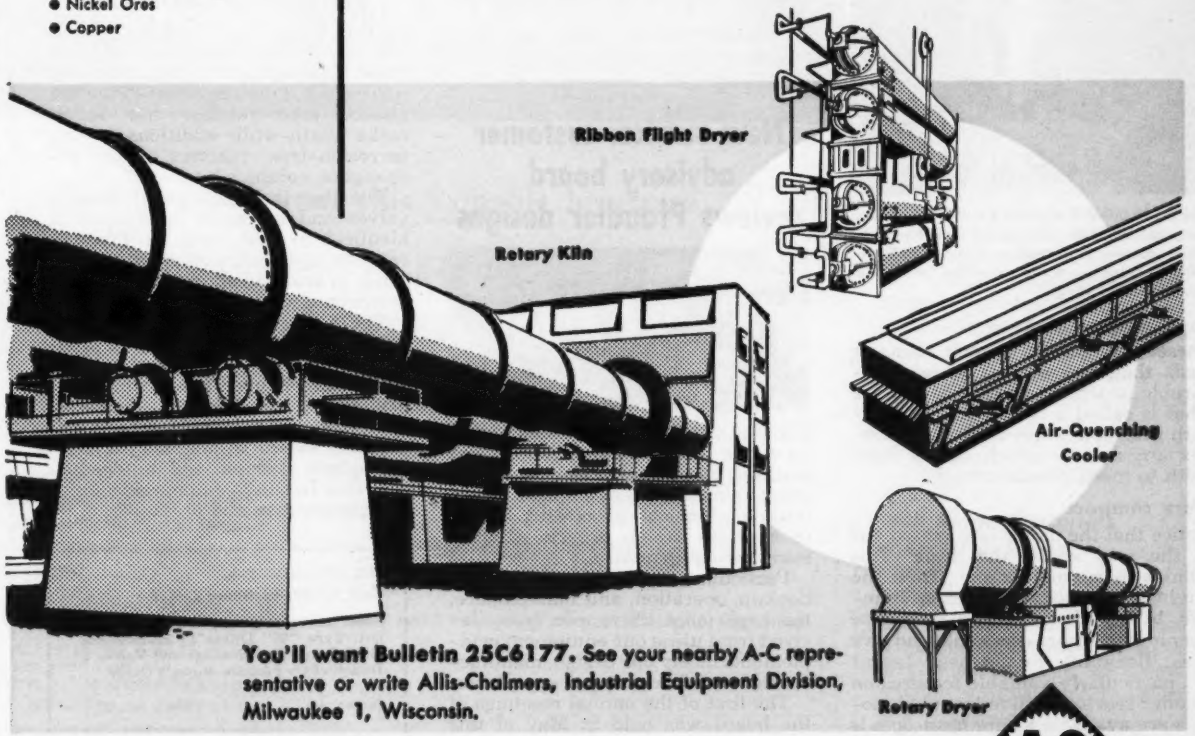
Equally important is the fact that Allis-Chalmers interest in your problems is continuous. Laboratory services, periodic equipment check-up and parts service are yours for the life of the equipment — and a long life it is, too.



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Corrosioneering News

Quick facts about the services and equipment available to help you reduce corrosion and processing costs.

Published by The Pfaudler Co., Rochester, N.Y., U.S.A.

New, more compact drive . . . power is higher, agitation range wider

When you can increase the load carrying capacity of a drive without increasing its size, you get at least three extra advantages. You get a wider range of agitation speeds, a compact unit that leaves surrounding area more accessible, and you eliminate cumbersome supports.

All this we have done with our new Type "W" Drives.

This 2.5W Drive is equipped with stuffing box. Can also be used with rotary seal. Hydraulic drives of the new design are available for 100% explosion-proof construction and wide, variable-speed range.

Carry greater loads

These new drives handle heavier loads than any other type of comparable worm gearing. They have what is called a "throated" design—both gear and worm teeth have convex arc shapes—which allows more teeth to mesh simultaneously.

More compact

Notice that the motor is mounted out of the way *above* the drive. This eliminates angular bracing from the top head, permitting a greater number of top head openings. These openings are more accessible and give great flexibility to top head layout . . . particularly valuable features on smaller reactors. (Side mounted motors are available where headroom is limited.)

Hydraulic, explosion-proof drives available

When you want 100% explosion-proof construction and wide, variable-speed range, you can specify hydraulic drives. These can be supplied at the factory or substituted for existing drives in your plant, by converting with hydraulic motors.

The new drives can also be furnished with double reduction gearing and flange-mounted motor. This provides a totally enclosed gear drive with agitator speeds from 525 to 7.3 RPM in 27 increments.

Complete flexibility

You can use the new "W" Drives with stuffing box or mechanical seal on both glassed and stainless steel reactors.

Standard 2.5W, 3W, 4W, and 5W Drives are equipped with constant speed sheaves with static-free belts that can be combined to give any required speed for the agitation you desire.

Complete data on design and performance are in Bulletin 951. Check the coupon for a copy.

New service: customer advisory board reviews Pfaudler designs

The best way to give a customer what he wants is to ask him. Pfaudler did just that by inviting a representative group of management engineers from leading chemical processing plants to appraise design aspects of their standard equipment.

Particularly in the areas of plant hookup, operation, and maintenance, the experience these men have derived from using our equipment complements nicely our design, manufacturing, and field service experience.

The first of the annual meetings of the board was held in May of this year and the commentary more than met our expectations. You will see tangible evidence of the Advisory Board's suggestions in our exhibit at the 26th Exposition of Chemical Industries (December 2-6, New York City).

The Advisory Board is an extension of our continuing efforts to encourage intercommunication between our own personnel and customers. Pfaudler Corrosion Seminars and Maintenance Seminars are still other facets of this program.

We are, of course, always happy to receive your individual suggestions as to how we can serve you better.

Another way of using glassed pipe—jacketed and unjacketed—is in the form of heaters and coolers. Over 10,000 feet were used in making up these polymer heaters and coolers.

Glassed pipe, fittings, valves, vital links in preventing corrosion

Getting materials to and from process equipment presents numerous areas of possible contamination and corrosion. This is why Pfaudler glassed pipe, fittings, and valves make worth-while additions to your corrosion-free reactors, heat exchangers, columns, etc.

The glass in Pfaudler pipe, fittings, valves and accessory equipment is identical to that used on Pfaudler reactors and tanks—resistant to wide range of acid and alkali corrosion and economically justified.

The smooth surface of glass also minimizes friction, speeding up product movement. Cleaning is simplified.

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Dept. CP-97, Rochester 3, N. Y.

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NUCLEAR NOTES

foreign markets must be developed without delay.

It opposes government subsidy of this development and calls for restrictions on availability and utilization of materials for nuclear reactors to be minimized to an extent consistent with national security. The declaration also recommends that a prompt solution to problem of adequate insurance or indemnification be found in foreign as well as domestic field.

Paraffin-lead shielding

Radiation shielding that can be molded into any size or shape is being produced commercially by California Ink Co., Inc., at its Berkeley, Calif. plant. Shielding, made of granulated lead in paraffin wax base, was developed by Dr. William H. McMaster at University of California Radiation Laboratories.

Euratom atomic energy firm formed

A new corporation with US and Belgian industrial ownership has been formed in Brussels to provide for rapid atomic energy development in the six Euratom countries. Principal owners of NDA Europe are Nuclear Development Corporation of America (NDA) and Societe Generale des Minerais, of Brussels. Projects will include application of nuclear energy to power, propulsion, and research.

Sodium reactor experiment produces electricity

Electric power has been produced from the AEC's Sodium Reactor Experiment (SRE) near Los Angeles, California. About 1000 kw electricity were generated in the first test. The experiment marked the first time a nonmilitary nuclear reactor has produced power for the generation of electricity by a private utility company.

The electricity produced was

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fed over the Southern California Edison Company's distribution lines. Reactor is designed to produce 20,000 kw of heat from which the Edison equipment will generate about 6500 kw electricity.

OMRE nears completion at Idaho Falls

Construction of Organic Moderated Reactor Experiment (OMRE), located at AEC's National Reactor Testing Station at Idhao Falls, Idaho, is essentially completed. Atomics International, a division of North American Aviation, Inc., is conducting OMRE for AEC to prove feasibility of power reactor moderated and cooled by hydrocarbon.

Atomic power plant for foreign market

Babcock and Wilcox recently made public details of its nuclear steam generating plant designed for the foreign market. The pressurized-water reactor included in the system is suitable for a utility plant of about 133,000 kw (electricity) capacity. Reactor could produce about two million pounds steam per hr.

Oak Ridge Institute's contract extended

The AEC has announced a five-year extension of contract with the Oak Ridge Institute of Nuclear Studies for Commission programs of research and education.

The Institute, a non-profit educational corporation of 35 southern universities, has been operating since March 18, 1947. New contract extends through June 30, 1962.

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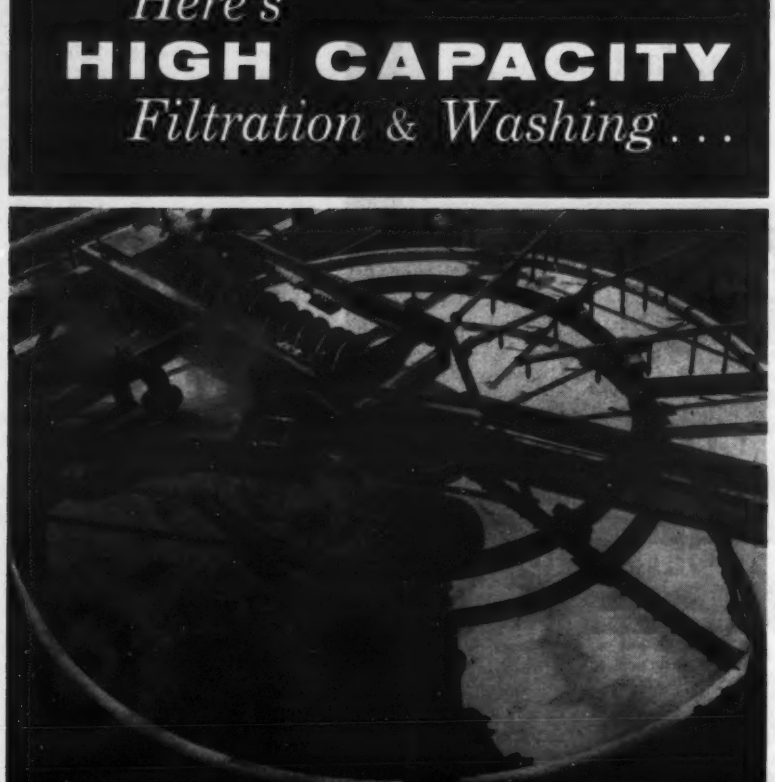

This un-retouched photo dramatically illustrates the fundamental advantages of the Oliver Horizontal Filter. Note the even feed distribution and maximum area utilization . . . without using a filter tank or agitator. Note, too, the fast dewatering of feed and the two stages of counter-current washing in a single pass on the table.

Installed at American Potash and Chemical Corporation's giant Trona, California plant, this Oliver operates around the clock producing agricultural grade potash. One of five Horizontals of the over forty Oliver Filters of various types at Trona, the unit has a wash efficiency of about 90%.

If you have a problem involving high tonnage filtration and washing of any fast settling, free filtering product, the Oliver Horizontal should be at the top of the list for consideration. Write for a copy of Bulletin No. 7201 for more information.

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recent books

reviews of current technical and reference work . . . summarized for you by authorities in the field with the CP staff

1956 Technical Manual for Textile Chemists and Colorists

The full name of this 626-page, 8½x11½" book is the "1956 Technical Manual and Year Book of the American Association of Textile Chemists and Colorists, Volume XXXII." William H. Cady, Editor, has gathered together the only published list of American dyestuffs. This he has arranged alphabetically, by Colour Index number and by prototype number. He also lists resin-bonded pigments alphabetically and by RB numbers and lists chemical specialties available for textile wet processing.

Other sections of the volume include AATCC organization, committee reports, test methods, bibliography of 27 pages, a buyer's guide, and a list of association members.

In recognition of the 100th anniversary of Perkin's discovery of mauve, the book is bound in cloth of that color.

To obtain the 1956 *Manual and Year Book remit* $6 ($5 *to AATCC members) direct to Mr. George P. Paine, Exec. Secretary, American Association of Textile Chemists and Colorists, Lowell Technological Institute, Lowell, Mass.*

The Chemistry of The Coordination Compounds

Reviewed by
GEORGE M. TOFFEL
Associate Professor of Chemistry
University of Alabama

Attention has been directed to coordination compounds during a period when the literature has become extensive and somewhat scattered. Hence, this ACS monograph (No. 31) should be welcome at this time. Editor Dr. John C. Bailar, Jr. is an outstanding authority in the field of coordination chemistry, to which he has contributed a large amount of original work. He and his associates have rendered a great service to chemistry and related fields in producing this up-to-date survey.

A 100-page general outline of the field is followed by three chapters that deal with ideas or theories formulated to account for coordination compounds. Special groups, e. g., polyacids, metal ion chelation, metal carbonyls, and nitrosyls, are considered in separate chapters. Application of theories on acidic, basic, and amphoteric compounds to coordination compounds is discussed, and oleation and related processes are covered. Organic molecular compounds in which bonding between the two components is usually somewhat less than hydrogen bonding are surveyed.

One of the major unsolved problems in the theory of valency is the constitution of organic molecular compounds. Recent studies reveal a wealth of facts concerning these compounds and should lead to the formulation of a better theory. An interesting application is the separation of straight-chain alkanes from branched isomers by preferred bonding of straight-chain alkanes to inorganic materials.

Physical methods used in the study of coordination compounds are described and applications of coordination compounds to electro-chemistry, analytical chemical, natural-product dyes, pigments, and water softening are covered. Intensive work on the application of coordination

chemistry promises to change many of our industrial processes from arts to sciences.

Inorganic chemistry in the past two years has been moving into the limelight. This advance has been due in the main to workers in coordination and solid-state chemistry. This 834-page book, with more than 3000 references to original literature, should stimulate application of the knowledge of coordination chemistry to many new uses. The text suggests areas of investigation which should yield profitable results to the research worker.

To obtain "The Chemistry of the Coordination Compounds" remit $18.50 direct to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N. Y.

Heterocyclic Compounds

Reviewed by
TOD W. CAMPBELL
E. I. du Pont de Nemours & Co.

The first four volumes of "Heterocyclic Compounds," edited by R. C. Elderfield, were published in the period 1950-1952. After a lapse of five years, two additional volumes have appeared. Volume 5 was published early in 1957 and was reviewed recently in CHEMICAL PROCESSING. Now volume 6 has appeared, and deals with 6-membered heterocycles containing two hetero atoms and their benzo derivatives.

The various topics are treated skillfully by experts. Thus, the Chemistry of the Monocyclic Dioxanes is reviewed by C. B. Kremer and L. K. Rochen, while the Benzodioxanes and the Sulfur Analogs of the Dioxanes are reviewed by Professor Elderfield. Professor Thomas L. Jacobs of UCLA has contributed chapters on Pyridazines and Cinnolines and Related Compounds. Phthalazine and Its Derivatives was written by R. C. Elderfield and S. L. Wythe, while G. W. Kennerly and Sir Alexander Todd contributed a chapter on Pyrimidine and Its Derivatives.

The Chemistry of Quinazoline is discussed by T. A. Williamson, and the Pyrazines and Piperazines and The Quinoxalines are covered by Yolanda T. Pratt. The Monocyclic Oxazines are reviewed by Norman H. Cromwell, the Benzoxazines by R. C. Elderfield, W. H. Todd and S. Gerber, Thiazines and Benzothiazines by R. C. Elderfield and R. E. Harris, and Phenazines, Phenoxazines and Phenothiazines by D. E. Pearson.

Delay in publication of this volume has produced some editorial problems since most of the manuscripts were submitted some years ago. For this reason the current literature has not been covered as adequately as might be desired, although an attempt has been made to include the more important new material.

Format of this 753-page book is that used in early volumes of this series and in other similar volumes published by Wiley, hence is of the highest quality. In general this book can be highly recommended for both the specialist and for use as a general reference book.

To obtain "Heterocyclic Compounds—Vol 6" remit $25 direct to John Wiley and Sons, Inc. Dept. CP, 440 Fourth Avenue, New York 16, New York. When inquiring, specify 5473A on form opposite last page.

Applied Mathematics in Chemical Engineering

Reviewed by D. S. DAVIS
Professor of Engineering
University of Alabama

This second edition of an old friend, "Applied Mathematics in Chemical Engineering," is almost entirely a new book. Joining forces with Harold S. Mickley, Sherwood and Reed have given us, in 413 pages, a volume that should meet the requirements of the most exacting of teachers and practicing engineers in this ever-changing field.

Among the principal topics are treatment and interpretation of engineering data,

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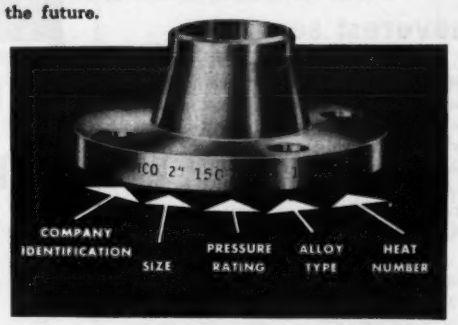

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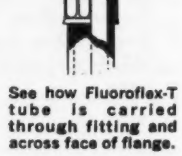

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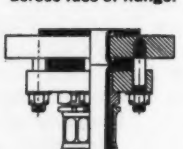

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formulation of physical problems, solution of ordinary and partial differential equations, Laplace transforms, and analysis through use of the calculus of finite differences. The discussion of empirical equations is unusually good, though references to the recent literature in that quarter seem a little meager. Most readers will have to draw heavily on graduate and preferably *recent* courses in mathematics for a grasp of the techniques, yet illustrative examples are presented in generous detail.

Each chapter closes with fresh, interesting, and clearly stated problems—113 in all. Line cuts are excellent, symbols and nomenclature are standard, and indexing is adequate. Pages are larger than those of the first edition; the whole scope of the project is wider, and at a higher mathematical level. In short, the authors, experienced masters in this realm, have achieved something unique, something challenging, and something that commands respect.

To obtain "Applied Mathematics in Chemical Engineering" remit $9.00 direct to McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y.

Encyclopedia of Chemical Reactions

Reviewed by
DR. LEONARD N. DEVONSHIRE
Assistant Professor of Chemistry University of Alabama

This encyclopedia was compiled from the files of the late C. A. Jacobson, and edited by C. A. Hampel. Volume VI presents some reactions of samarium, scandium, selenium, silicon, silver, and sodium in 438 pages. Volumes I through V treated elements preceding samarium, in alphabetical order.

Each entry consists of one or more reactions of a given element or compound, described by means of chemical equations and in words. Reference to one or more of 93

scientific periodicals and to the abstractor are included in each of the 1710 entries.

Attractive features are an index of reagents by formula and name, and sections that are entitled bacteria, decomposition, and radioactive decay. Index to reaction products comprises the last 19 pages.

This series provides a quick and convenient reference to a large number of reactions. It is sufficiently comprehensive to be useful in locating information for which a more complete library search is unwarranted, yet is compact enough to be accessible in the office and laboratory.

To obtain "Encyclopedia of Chemical Reactions — Vol. VI" remit $12.50 *direct to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N. Y.*

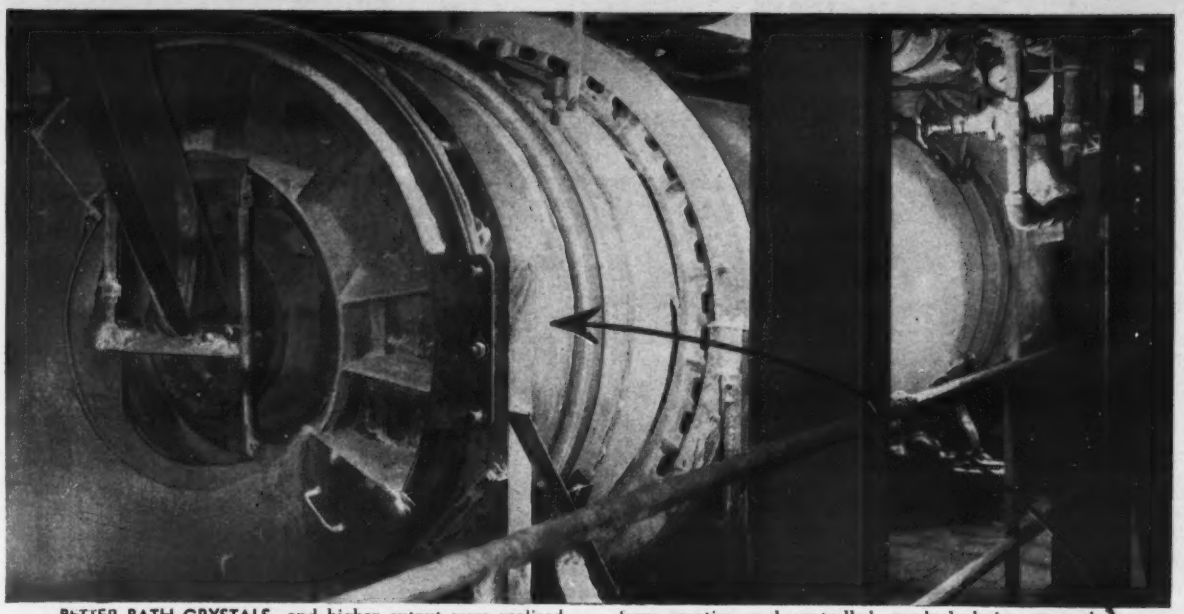
The Chemistry of Organometallic Compounds

Although organometallic compounds have been known for more than a century, this is the first book that treats the subject in a comprehensive, yet brief and readable, form.

Authors D. T. Hurd, R. N. Lewis, and E. G. Rochow have organized this 344-page text into eight chapters. The first three chapters cover general considerations, theory of the carbon-metal bond, and preparative methods. The next seven chapters discuss compounds of each of the groups of the periodic table, and the transition metals.

Chapter eleven is devoted to organic synthesis, and chapter twelve is a short one covering special types such as fluorocarbon derivatives, metal carbonyls, carbides, and hydrides.

To obtain "The Chemistry of Organometallic Compounds" remit $8.50 *direct to John Wiley & Sons, Inc., Dept. CP, 440 Fourth Ave., New York 16, N. Y. When inquiring check 5475A on the convenient Reader Service slip which is located opposite last page.*



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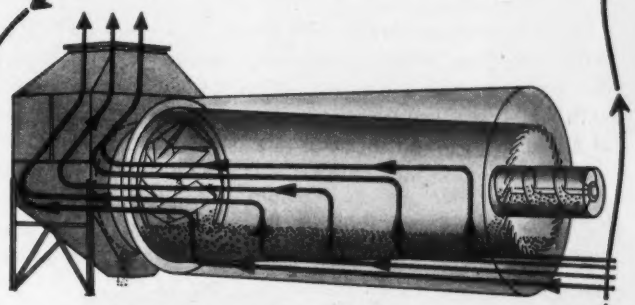

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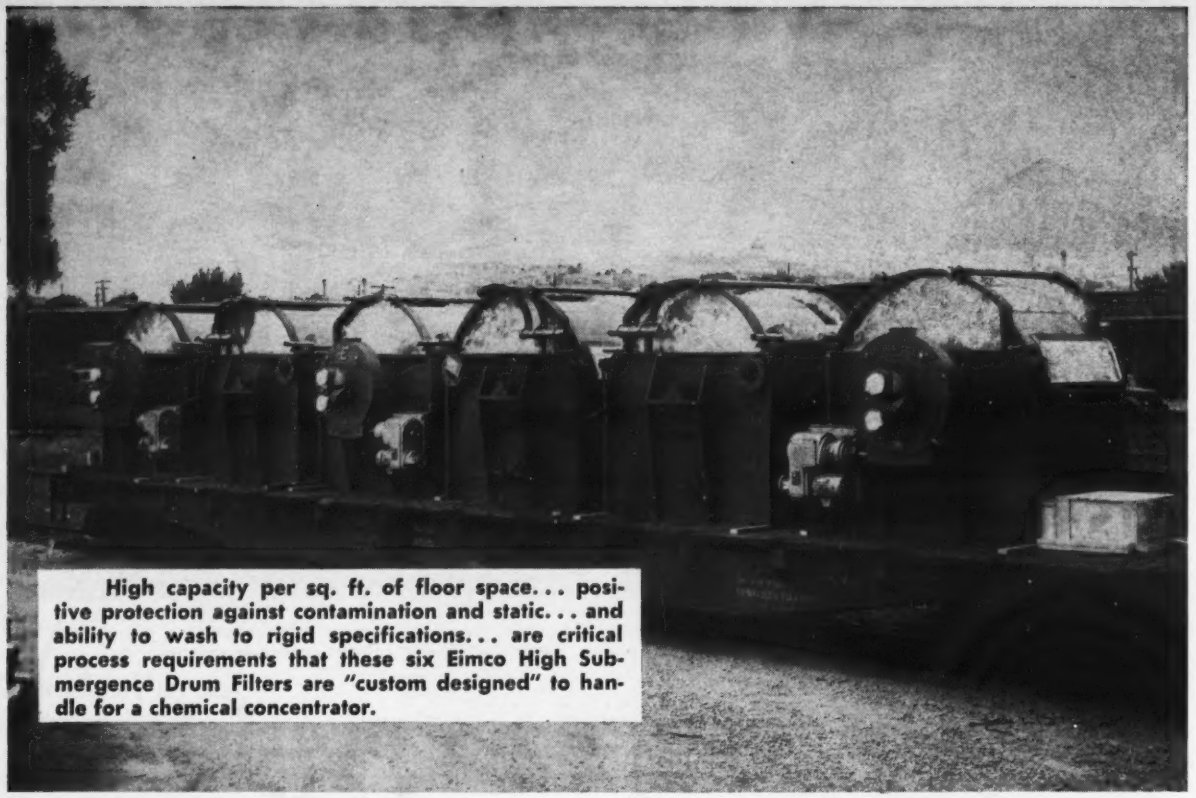

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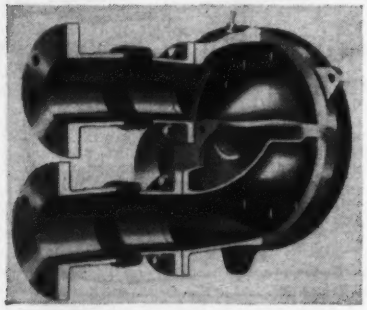

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RECENT BOOKS

Chromatography — A Review of Principles and Applications

This second, completely revised and enlarged, edition by Edgar and Michael Lederer presents an up-to-date survey on chromatography. It incorporates all the significant advances in the field and covers a wide range of techniques, equipment, basic principles, applications, and results.

Chromatography of both inorganic and organic substances is dealt with in detail, covering partition, adsorption, and ion-exchange methods.

Big feature of the 700-page volume is the large collection of R_f values listed in some 175 tables. The large literature reference appendix lists literature published on chromatography up to September 1958.

To obtain "Chromatography — A Review of Principles and Applications", Second Edition, remit $12.75 direct to D. Van Nostrand Company, Inc., Dept. CP, 120 Alexander St., Princeton, N. J. When inquiring specify 5477A located opposite last page.

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Three detailed chapters are devoted to the history, economics, and the ores and their sources. Lengthy bibliographies follow each chapter.

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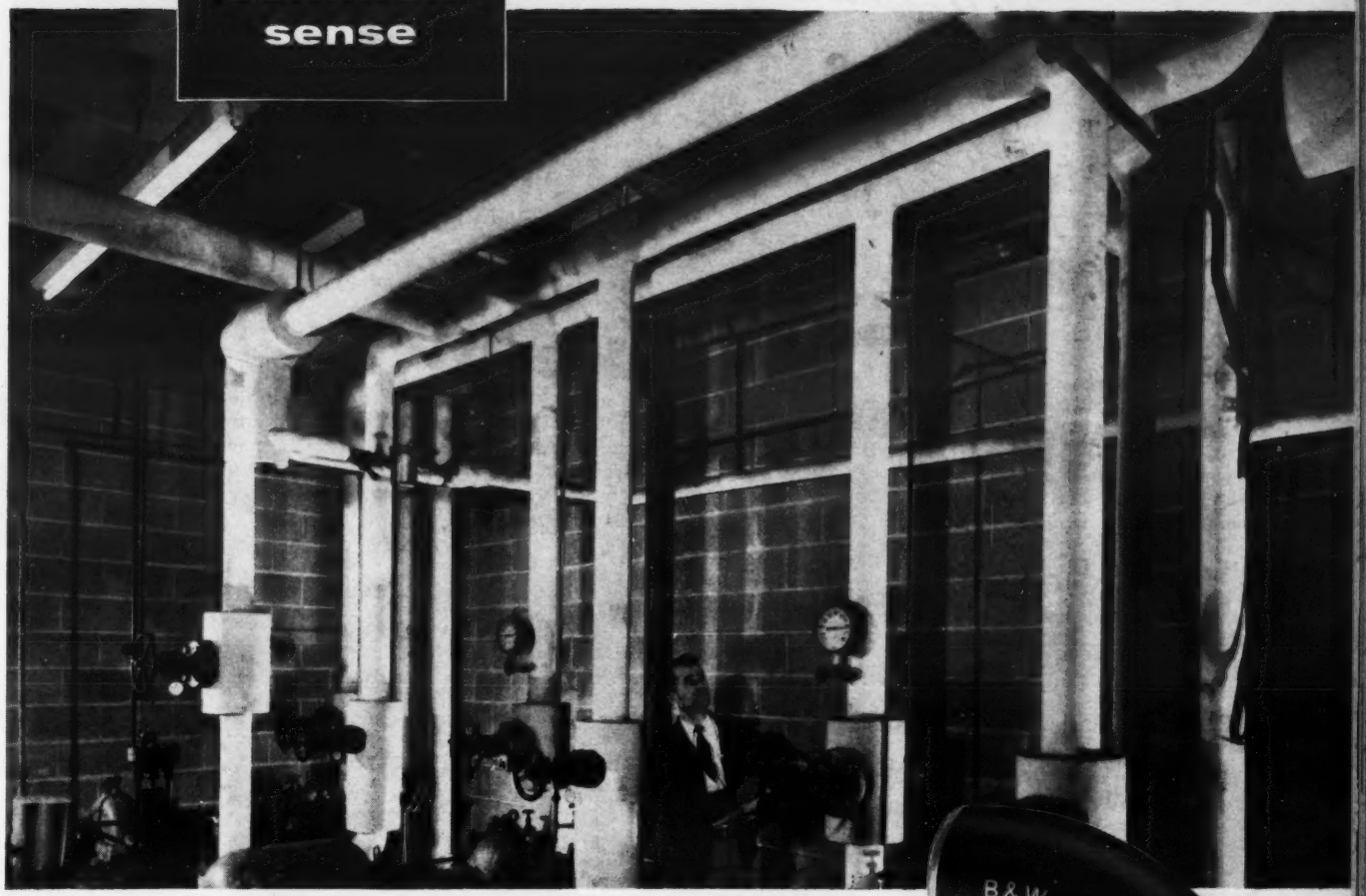

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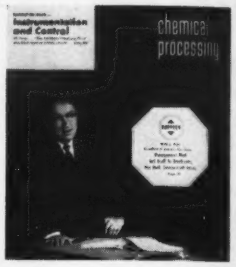

The Struggle For Men's Minds

The future of America lies in the minds of men and in the vigor with which they pursue plans public opinion holds to be right. In this respect, there is a battle going on today between labor and management.

In many instances labor and management have linked arms because of mutual interest and belief in the same goal. But, in some of the major areas of economics and politics, labor leaders and management differ in their beliefs as much as day and night.

Education is the prime factor in molding opinion. The side that is the most vocal has the best chance of winning. Mr. Foy believes that management has been dragging its feet in this respect. It has consistently failed to tell its side of the story adequately. Management may lose this fight unless it does something quickly.

This article tells what management can do, and how to do it, before it's too late.

MANAGEMENT MUST SELL ITSELF TO THE EMPLOYEE

FRED C. FOY,
President
Koppers Company, Inc.

There is a battle going on today for the minds of employees. The battle is between unions and management and involves many conflicting philosophies of great importance.

The trouble with management seems to be that it wants to duck the fight. The unions, on the other hand, are looking for one. It is quite obvious that an employee, in order to formulate his opinion on an issue, needs forceful discussion from both sides.

On the few occasions during the past 2½ years when management has sought to use its private comunications media in an attempt to influence national, state, and local legislations, it has often done the job so timidly or in so involved a fashion that its employees must often have been left asking "why" to a lot of questions which should have been faced squarely and simply.

During the past 2½ years management has been taking a licking. It has done a fine job of selling management to management, but once outside the walls of meeting rooms, many members are failing to use all the resources at their fingertips which would help expose the economic fallacies propounded by some union leaders. Management is like an ostrich that theoretically hides its head in the sand at the first sign of danger.

Management's conservatism and what seems to be a cautious, negative approach to controversial issues in telling its story to employees has created misunderstanding, even disloyalty, among the very people it wishes to influence most. And, by not doing the job it should do, it permits this antagonism towards management to spread.

In constrast, union leaders are vigorously and effectively driving home to their members their arguments and their point of view. Week after week they pour out a flood of carefully planned, well-written articles which — irrespective of geographic area of union identity — advocate more government participation in the economy. These articles reflect a solid labor front on almost every major policy question.

FRED C. FOY was graduated from the University of California. For a time, he was Manager of Public Relations for the San Joaquim Light & Power Corporation at Fresno, California. In 1930, he joined the J. Walter Thompson Company, remaining with them for three years before becoming Advertising Manager of Shell Oil Corporation. After several years he joined the Young & Rubicam Advertising Agency, remaining with this organization until the outbreak of World War II.

After service in Washington as Director, Purchases Division, Army Service Forces, with the rank of Colonel, he again joined J. Walter Thompson as Vice President and Manager of its Detroit office.

Mr. Foy came to Koppers as Vice President and Manager of its Central Staff Sales Department in 1948. He was elected Vice President and General Manager of Koppers Tar Products Division in 1950. On May 26, 1954, he became a member of the Board of Directors of the Company. Mr. Foy was elected to his present position as President of Koppers on March 8, 1955.

On the other hand, management publications — the so-called house organs of industry and business, large and small, and reaching the same membership as union publications — fail, with a few exceptions, to reveal similar articles vigorously and candidly telling workers what management feels is good for America and why. Usually well-written and often beautifully printed, these management-edited publications cover mainly employee social news, company sports activities, and news reports about the company and its products. For the most part they remain conspicuously silent on such basic subjects as the profit system or on key current issues before the national and state legislative bodies.

Isn't it about time management took another look at what its own employee publications are for? At what they can do? At what questions should be raised in them?

Too often the policy seems to be one of ducking controversial issues. Presumably this is done on the grounds that employees 1) wouldn't read such material, 2) wouldn't believe it, and 3) would resent it. What easier, more logical, or more direct way is there of opening the door to better understanding than using company employee publications as the key? And don't forget, either, the importance of bulletin boards, the Reading Rack, letters to employees, and other means of communications. How can employees make up their minds unless both sides of an issue are presented to them? The unions are doing a terriffic job in presenting their side. It's up to management to present theirs, too!

Doesn't management believe

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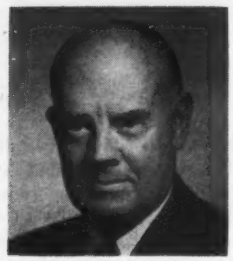
Comments by chemical company executives on —

The Tariff Question *and the* Chemical Industry

Glen B. Miller

President
Allied Chemical & Dye Corporation
New York 6, N.Y.



CHEMICAL PROCESSING deserves credit for publishing the timely discussion of the United States Trade Policy. One can't read the conflicting views expressed by Messrs. Lloyd and Swensrud without being impressed by the complexity of foreign trade and concluding that the problem does not lend itself to any doctrinaire solution.

It is significant that the 1956 trade pattern of the United States reflects the culmination of two divergent trends over a 10-year period: (1) of a steadily increasing proportion of dutiable imports, with the result that they exceeded duty-free imports for the first time since 1910; and (2) of a steadily decreasing level of customs duties on dutiable imports. In the case of chemicals, for example, the average U. S. duty was reduced nearly 50% in the same period.

When one considers that chemical exports are principally mass-produced products, while chemical imports are primarily highly processed items having a relatively high labor cost, it is clear that the need for reasonable tariff protection cannot be answered by reference to an export-import ratio. Rather, as the Manufacturing Chemists' Association stated to the Randall Commission:

". . . United States international trade policies should be based upon furnishing sufficient encouragement for the domestic production of those quantities of those products which the nation can best produce, from the standpoint of its own welfare and national security. Our policies should not necessarily confine our production to those products which we can produce more cheaply than other countries.

"In view of the complexity of the chemical industry and the interdependence of its processes, it is of the utmost importance that tariff rates applicable to chemicals continue to be established by individual products or closely related groups of products, rather than on any 'across-the-board' basis."

Harry A. Bullis

Chairman of the Board
General Mills, Inc.,
Minneapolis 1, Minnesota

The article by Dr. Lewis E. Lloyd entitled "Tariffs Police Chemical Markets," marshals strong arguments against "free trade." The issue today is not "free trade" but a "liberalization of trade." Businessmen know that "free trade" is as idealistic as "perfect competition" and that neither is attainable.

I have no quarrel with protectionism which is in the national interest for reasons of defense or for the good of large segments of our people. Protectionism helped build our industries. They have thrived and grown efficient. They are competing in world markets. However, where an industry feels impelled to seek protection, it should state its case honestly and just as honestly accept the verdict as to whether or not such protection is in the national interest.

In his article entitled "The Case for a Liberal Trade Policy," Sidney Swensrud mentions our increasing dependence upon imports of raw materials. Domestic sources are being depleted and our population continues to increase. Although at present our exports exceed our imports by a considerable margin, it is quite possible that within the next two or three decades, we may have a reverse situation. When that time comes, we will need to be in a position where we can successfully compete in export markets. Export trade cannot be developed quickly.

This is all the more important, because the Communist nations will be our toughest competition. They are gaining in efficiency and unless we attune ourselves to the significance and importance of world trade we may be in second place.

I believe President Eisenhower's program for liberalizing trade with the rest of the world is sound. I believe that program will build for the future. Under it, he does not propose to give more than we receive. It is a flexible program which can be adjusted to conditions, within limits set by Congress, and it will benefit the United States as much as it does the nations with which we trade.

Robert B. Semple

President
Wyandotte Chemicals Corporation
Wyandotte, Michigan

Dr. Lloyd and Mr. Swensrud are not far apart in their philosophies and general aims, but Dr. Lloyd expresses the belief my associates and I hold that the U.S. chemical industry cannot pay high wages, build new plants and carry on job-creating product research if we must buck low labor, low construction and low research costs prevailing in overseas competitive producers.

One factor cannot be stressed too strongly. That is the impact

upon U.S. chemical research and its influence upon the employment pattern of the future if foreign products drain off our volume and our potential profit to the end that we must reduce research expenditures.

Lost business to low labor wage countries coupled with the unrealistic depreciation policies now affecting U.S. higher capital expenditure industries, can be a spiral of fast and lasting harm to the whole U.S. economy and the world economy, too.

Rothe Weigel

President
Victor Chemical Works
Chicago 6, Illinois

Mr. Swensrud and Dr. Lloyd agree that it would be neither sound nor realistic to eliminate completely all tariff and other import restrictions at this time. Except for this, these gentlemen view foreign trade from different angles. Dr. Lloyd desires to preserve the jobs that supply our domestic market; Mr. Swensrud is more interested in preserving the jobs that produce our exportable surplus. Jobs are involved in both instances.

Mr. Swensrud's data show that our exportable surplus is greater than our need of imports. Since World War II, our Government has subsidized the exportation of this surplus through foreign aid grants and gifts of military equipment, and by buying up agricultural products and dumping them abroad. The liberal trade policy advocates urge that this government subsidization of our exports be curtailed and that foreign beneficiaries pay for them in goods.

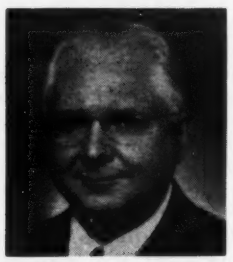
Dr. Lloyd agrees, provided that the goods imported in payment shall be of a kind needed in this country and which will not create surpluses nor increase surpluses already in existence. If such imports cannot be found, he proposes that tariffs be maintained at levels which will equalize costs of production here and abroad.

This will give the American producer an even chance to compete with the foreigner and retain a reasonable proportion of his business, just as he now competes with his domestic competitors. In this way imports would consist of a large variety of commodities, and the curtailment of U. S. production to accommodate these imports could be spread over a wide section of the economy. No one group of producers need be sacrificed.

This, I believe, is all that American Industry should ask of the tariff, and this is really what industries want — a fair chance to compete.

Ernest Hart

President
Food Machinery and Chemical Corporation
San Jose 6, California
Chairman of the Board
Manufacturing Chemists' Ass'n., Inc.



The Manufacturing Chemists' Association has maintained a consistent stand on United States Tariff policies since its statement to the Commission on Foreign Economic Policy (The Randall Commission) in November 1953. Briefly stated, this position is that the Association does not favor any across-the-board reductions or increases of tariff rates, but does favor the establishment of rates to protect certain types of domestic production which are essential to the economy and defense of our nation.

In an integrated industrial economy, such as ours, and especially in a segment of it as complex as the chemical industry, there are a number of key types of production which must be maintained at all costs to preserve a sound economy and adequate defense. We cannot afford to depend on foreign sources for such essential production.

The Manufacturing Chemists' Association has consistently held that the United States can and should establish tariffs on a selective basis which will assure continuance of its essential production and, at the same time, can work out foreign trade policies in keeping with U. S. world objectives. As President of Food Machinery and Chemical Corporation and as Chairman of the Manufacturing Chemists' Association Board, I subscribe to these views.

T. G. Hughes

President
Oronite Chemical Company
San Francisco 20, California

We in business and industry have got to accept the fact that the world has shrunk in time and distance, and this shrinkage has thrown us together with the other peoples of the world in a state of absolute mutual dependency.

We have paid out billions of dollars in foreign aid to help our friends after World War II. But this assistance can't go on forever. Now these friends have gone a long way in the process of rebuilding. They are ready and anxious to start *earning* their dollars. But they have run into a wall — the American tariff wall.

It costs us more billions every year to keep this wall in repair. That is the margin of our exports over our imports. Our foreign friends can get dollars to main-

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CP SURVEY:

How the big companies reward employees for inventions

A survey of chemists and engineers employed by the big (all are over $1 million) companies in the chemical and allied industries shows that the methods used to reward technical employees for inventions range from nothing to large bonus or special award plans. The technical people queried indicated the desire for extra compensation and/or some form of professional recognition. Attitudes towards the various methods are mixed — the pros and cons both pointing out logical explanations as to why they feel as they do about the various methods

How does your company reward employees for inventions made on company time? Do you think your company's method is an effective way to reward inventors and stimulate initiative to contribute more? Which method would you prefer?

These were the main questions asked of a selected group of technical people employed by the big (all are over $1 million classification) companies in chemical, petroleum, and other allied industries.

The answers to these questions expressed a feeling of rather mixed emotions on these subjects. On the question of how effective they thought the various methods to be, there were some very strong pros and cons (See Table 1 on facing page).

The various methods used were reported as ranging from no definite one to large bonus or special award plans. An interesting point was that quite a few brought out that they were not aware of their company's policy, as it had never been spelled out to them.

The majority (75%) felt that the $1 token, or no definite company plan, was an unsatisfactory method. They were fairly satisfied when the payment was over $100. Quite a few thought that money is the best way to reward, while others would like some other form of recognition (Table II). Even more thought that both are important.

Those that favored the $1 token plan brought out the idea that teamwork is necessary to the development of ideas, and that larger payments would destroy this teamwork effort. They were satisfied with the idea that obtaining patents was part of their job. However, many indicated that something was needed to stimulate their initiative to contribute more.

Those that felt the $1 token plan was inadequate compared it with the "suggestion reward" programs for non-technical employees. They thought that the plan should at least equal these programs. Many stated that although their companies publicized consideration of patents in granting merit raises, there didn't seem to be much evidence of this.

A tabulation (Table III) of the companies' methods of rewarding brought out that the petroleum companies generally pay more than the chemical companies. Five out of ten petroleum companies pay $50 or more — the average being between $100 and $150 — compared to one chemical company out of 33. (Two people from this company said the payment was $110.)

Only one petroleum company out of the eleven pays the $1 token, compared to 14 of the 33 chemical companies. Seven of the 33 chemical companies have no definite method.

Two chemical companies had both large bonus or special award programs, or gave a percentage of the royalties (listed under "other" in Table III).

Four chemical companies exploit publicity and other methods to give inventors recognition for their work, while nine definitely use the patent when considering merit raises.

A small percentage of the companies, although payment is low, give the inventor publicity or recognition and/or consider the patents when granting raises. Table IV gives a breakdown on this.

What they had to say . . .

. . . about the $1 token payment or no apparent policy

PRO–

"Patents considered only one of many factors influencing salary and standing. Others working on the problem are rewarded in salary, even though they do not get a patent. Salary and non-monetary awards are certainly very important. They apply for good solid plugging work as well as for obtaining patents. Most good patents now are the result of much long detailed work by a number of people. The patent may be the culmination of this work, but rewards should not be confined to the man in whose name the patent appears. Too much emphasis on this causes cut-throat competition and makes cooperation very difficult."

"Believe our system is good provided real leadership is provided by research administration. In my opinion, incentive awards for patents may be good for highly productive people, but does not properly award development people."

"I think it is effective. No one works strictly for patents. This is incidental in normal work and research. Publications are permitted, which is important for recognition and prestige."

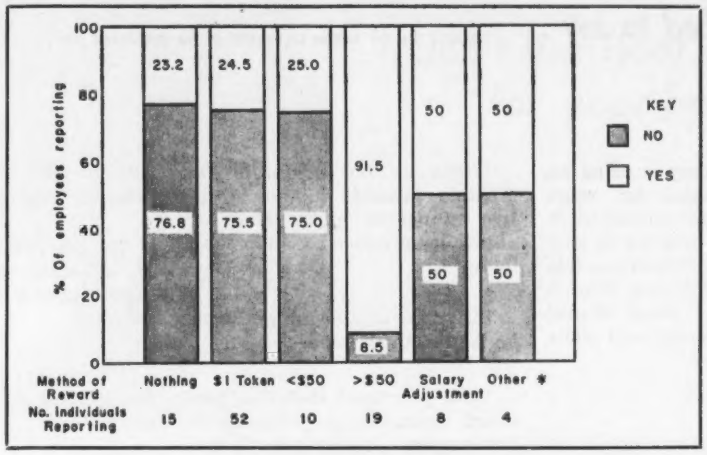
"Company stresses obligation the employee has, since company furnishes atmosphere and facilities to prove ideas. Token payment of $1.00 and recognition in intra-plant newspaper appear to be sufficient reward."

"A truly creative person will advance in salary as a result of his contribution, although it is not specifically stipulated as to quantity."

"The philosophy is that patents developed by company employees on company time are rightfully company property. Initiative must be stimulated by other

Turn to next page

Table I. What the Individual Employees Reported "Do you think your company's method of rewarding is an effective way to stimulate initiative?"



*"Other" includes large bonus or special award programs

Table II. What the Individual Employees Reported "What do you think is the proper reward for patentable ideas?"

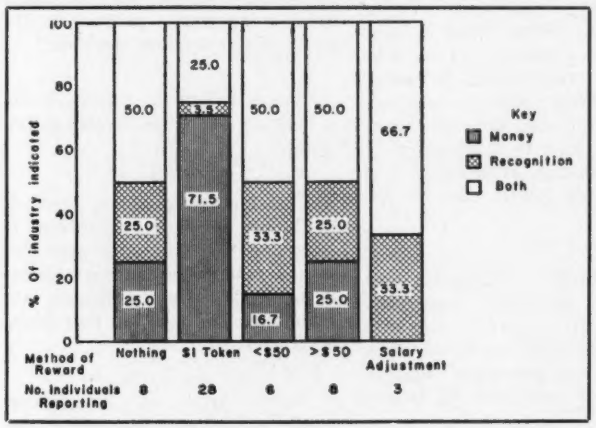
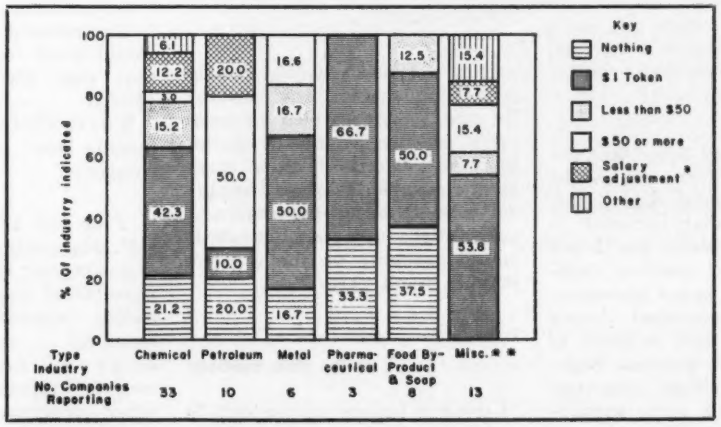


Table III. How the Companies Reward Inventors



*"Salary Adjustment" means salary increase was immediately awarded

**"Misc." includes synthetic fiber and plastic, design and consulting, paint, paper, and electrical firms

What they had to say . . . about the $1 token payment or no apparent policy *Starts on page 28*

means. The company is using an 'idea bonus' scheme for wage people who are not employed in a job where idea-making is part of the normal job. Sometimes this causes more hard feeling than it does good will. I think liberal recognition by management alone would be effective."

CON–

"People do a day's work for money. The 'extra' that a man puts in for creation and patents should be recognized in some way. Publicity and recognition are part of it but an expression in a form that is a standard is very stimulating. It is something that a man's family can recognize."

"Not effective. Publicity and recognition definitely important but monetary reward is also important. Rewards should at least equal the most generous 'suggestion reward programs' in better companies."

"Company at present uses 'merit raise' system. Actually all conscientious workers get same percent raise. There is no real incentive for stimulating initiative."

"The company does not use publicity, recognition, nor monetary awards to stimulate initiative, but feel that initiative is part of an engineer's job. I believe that for a creative engineer a stimulus is not necessary. However, a somewhat larger token payment with a letter of recognition from someone higher than an immediate supervisor would be a much more gratifying 'pat on the back'."

"There is no substitute for tangible rewards as an incentive to devote extra time and effort to produce a patentable item."

"Any type of recognition would be better than none."

"It is presumed that if a patented invention is profitable to the company, salary adjustments will be made. However, this is an arbitrary procedure. A more stimulating procedure would be to award extra dividends to inventor in relation to worth of invention. Patents and technical articles regularly provide sufficient non-monetary rewards."

"There exists no initiative for a person with an investigative mind."

"I prefer the monetary reward. Little publicity or recognition is extended. To those who have obtained patents here, there seems to be very little significance attached as far as the individual is concerned."

"Any type of recognition would stimulate initiative. Present method is in my opinion inadequate. Present policy indicates a lack of interest in basic developments."

"No, a token payment hardly is a stimulant for any activity. Reward systems which increase one's prestige would be better than no reward or token payment. In spite of all philosophical arguments to the contrary, substantial monetary rewards would probably be the greatest stimuli in all cases."

. . . on the other methods

"I think it (salary adjustment) is as effective as any method. Creative people are satisfied with publicity and recognition."

"Believe present method ($150) is effective since (company) holds such a large number of patents."

"Partially effective ($110). Recognition would stimulate initiative."

"The present method ($50) appears to satisfy the personnel. However, no recognition or publicity is given.

I believe recognition as well as monetary rewards would be far more appealing."

"Yes (payment of $100 is effective). Technical development is responsible for innovations, improvements, and novel methods; and the carefully chosen group is not stifled by individual competition.

Patentable ideas are reviewed by a committee and legal counsel, but the best ideas are protected best by quiet adoption and kept that way."

"Yes — great reward (than $10) for patents would tend to destroy that teamwork necessary to develop most patents."

"Professional recognition would seem to be more important than the token payment ($100).

Worthwhile and profitable patents are exploited by the company."

"I do not believe that by itself, salary adjustment is enough. Our company is very generous in payment of dues in technical societies, expenses in attending meetings . . . and in standing the expense for correspondence courses, special schooling and other programs for individual development."

"Fair (some bonds) — some publicity is generally given."

"Policy ($150 and public presentation of award, recognition) is effective . . ."

"Yes, because it (bonus plans for exceptional contributions) allows flexibility and adaptability.

"I do not consider the token payment ($20) as an incentive at all. The major incentive therefore would be consideration of these patents when an advancement is pending."

"Basically, yes ($10)! Monetary reward should be a healthy token payment. If a non-token sum is give, too much friction is likely to arise in cases where inventorship is not perfectly clear. I feel that the non-monetary rewards should be increased — e.g., recognition in the local *and hometown* newspapers. If I were a Research Director, I should compose a suitable personal-type letter for the president of the company (or the R & D VP) to send the recipient on issuance of the patent. Small, thoughtful actions such as the above would pay *many indirect* dividends at an insignificant cost to the company. Once the patent application has been made why not suggest to the man that he might also be able to submit the material for publication in a journal? I know of no better way of upgrading a man's ability than to have him critically evaluate his work (and writing) before submitting it to a journal referee. Since very little of this would be on company time the cost is again insignificant.

Patents and papers must be considered as part of a man's productivity record when his salary is reviewed. Men who consistently do patentable thinking and work expect more of themselves and of their company." ■

Tariff Comments

Starts on page 26

tain this margin from only one source — the American taxpayer. No reasonable man is arguing for abrupt and complete obliteration of all protective barriers. But if we cannot alter the fact that lower barriers are bound to pinch somebody, neither can we change the fact that our friends abroad have to trade with us to keep afloat.

In today's world we have almost a monopoly upon dollars, and our primary need is for ever-expanding markets for the goods we produce in such abundance. But if we expect ships to leave our ports filled with cargo, we must expect them to return with cargo.

Thomas D. Cabot

President
Godfrey L. Cabot, Inc.
Boston 10, Massachusetts

Other countries have invented restrictions on imports which are far more effective than US tariffs. The US chemical industry as a whole with its huge exports should be especially eager to see a reduction in these restrictions. We have a strong bargaining position and in my experience our Government has sent strong teams to the bargaining table. We have fared well, for imports from overseas are less than a quarter of one percent of the chemicals used in the US. In many lines and many markets we sell by export the major portion of all the chemicals sold.

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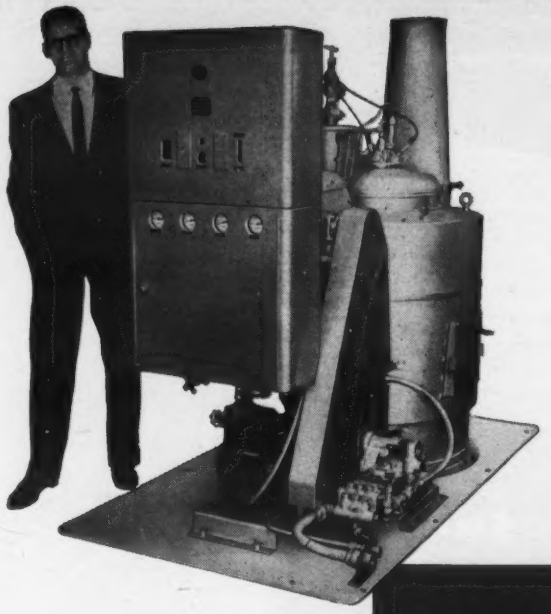

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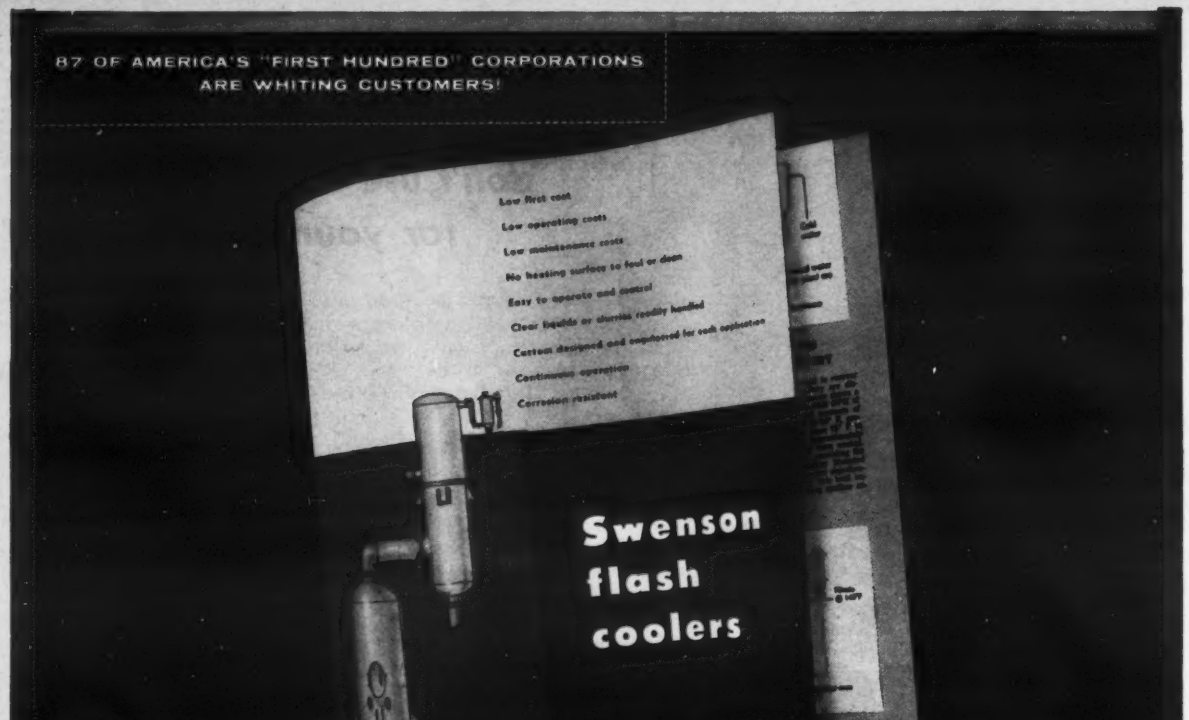

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Tariff Comments

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I am for more and better bargaining and believe the roundtable multilateral approach is best. Let's renew the Reciprocal Trade Act, and improve the administrative machinery for bargaining by passing the OTC Bill so that we can protect our markets abroad. Surely we in chemicals need not fear that we will suffer from this bargaining. Our industry is peculiarly favored to survive in world competition for high labor rates affect us less and large productive units affect us more as to costs than almost any industry one can name. ■

Unions vs. Management

Starts on page 25

that its economic system is good for America? Why should it be shy about telling its own people the why's and wherefore's? If management has a good product, it is never bashful about advertising it to the world. What is different about telling the virtues of its beliefs?

In the few cases where management did tackle an economic problem in print it has done so in such a "ladylike" and restrained manner as to lack much of the force found in the union approach. Management apparently is maintaining its dignity. The audience it wishes to reach understands toe-to-toe slugging better. How can management go about doing this and what should the plan of action be? A number of decisions are involved. Here they are:

1) *Deciding to do it* — A good many managements will do a lot of "hemming and hawing" over this one, which comes first of all. Some will bog down at this point. There isn't any question but that management can do it if it wants to; it just hasn't wanted to enough up to now.

2) *Being willing to let company publication editors write the material simply and understandably as the unions are*

Turn to page 285

With technical graduates so scarce these days, are we "wasting" this talent by using it in a sales capacity? Here, a vice president of a large chemical company votes a resounding "NO" . . . and backs up his thinking with reasons drawn from his company's years of experience with the "technical representative."

WE NEED TECHNICAL MEN IN CHEMICAL SALES

JOHN A. FIELD,
Vice President
Union Carbide Chemicals Company
Division of Union Carbide Corporation

We, at Union Carbide Chemicals Company, *want* technically trained salesmen in our company. Some chemical companies may feel that a technically trained salesman is unnecessary, but we feel quite to the contrary.

Our business is to sell over 400 different chemicals, most of which are used in chemical reactions. We believe it is essential that our salesmen have at least a bachelor's degree in chemistry or chemical engineering. Many of our salesmen, or "technical sales representatives," as we refer to them, have Master's and Doctor's degrees. Of course, we need men trained in liberal arts and business administration in the various phases of Carbide's activity, but we nearly always insist on technical training for our sales staff.

Salesman's Work *is* Technical

In today's expanding economy, technical innovations are essential to business survival. Much of Carbide's growth has resulted from a service to its customers to permit them to take advantage of changing technology and thereby expand their own companies. Our customers now look to our salesmen for technical service that will help their businesses move ahead. This means new uses for established chemicals, and brand-new chemicals that help to create new products and new markets. *A salesman under these circumstances must be a technical consultant to the customer and must be as well-grounded as possible in the technical phases of our business as well as the customer's business.*

Let's consider what a salesman needs to know in order to give his customers this type of service. He must have a thorough knowledge of the available technical information on the product. He must be on speaking terms with the type of equipment in which it will be used. And above all, he must be sufficiently sure of his facts that he does not waste the time, energy, and money of his customer by making foolish suggestions.

On the average, a Carbide salesman will serve some 20 different industries in his territory. For instance, in each of our territories there will be at least one pharmaceutical manufacturer, several producers of surface coatings, a textile specialty manufacturer, a metal processing establishment, and a host of other miscellaneous businesses. We sell chemicals to all of these industries and our salesman must be familiar as possible with the processes and problems of each of his customers.

A big order? Maybe . . . but let's look at an illustration of the need for technical ability. This salesman is handling agricultural chemicals. Carbide is now marketing several pesticides and a larger number of intermediates for the manufacture of other agricultural chemicals. The salesman must be prepared to answer dozens of involved questions concerning the characteristics of these products. He must be able to tell the customer what are the latest laboratory reports on either insecticides, fungicides, or herbicides and to compare the findings of our research with those made by the customer or often by a competitor.

He may be asked to suggest ways to correct processes that are not working well, to explain unexpected variance in biological activity, to suggest formulations for specific applications and to consult on an entirely different problem, such as the best method of fertilizing strawberries. Even a good technically trained salesman may not have all the answers. But he must be able to understand the questions and to convey to the Technical Service Department a clear statement of his customer's problems. A man without a scientific background cannot be expected to perform satisfactorily

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JOHN A. FIELD

. . . is one person who should know the value of the technical man in sales. Since joining Union Carbide in 1936, as a unit foreman, he has come up through the production and research ranks to his present capacity as Vice President of Union Carbide Chemicals Company. In this position, he is responsible for sales development and related activities.

He received his BS degree in chemistry from Yale University in 1935, after which he attended Oxford University on a Henry Fellowship.

His duties outside company circles have included manager of the production control section, Office of Rubber Reserve of the Reconstruction Finance Corporation, during World War II, and Assistant Administrator of the Business and Defense Services Administration, US Department of Commerce for a six-months period in 1954.

". . . it is the responsibility of the recruiter to present a realistic picture of the opportunities offered by his company"

How does your engineer-recruiting program stack up? With the shortage of such trained manpower today, you can't afford to have "just average" operation. Here are some tips for . . .

Effective Recruitment of Graduate Engineers

EARL C. KUBICEK, Director
Alumni Relations & Placement
Illinois Institute of Technology

If you were being graduated today from one of the nation's accredited engineering colleges or universities and read such headlines as,

"SUPPLY OF VITAL EXPERTS TIGHTENS: SOME TALK OF THREAT TO U. S. SECURITY," or

"FIRMS BID HIGH FOR GRADUATES," or

"COLLEGE GRADS FIND JOBS MORE PLENTIFUL AND SALARIES HIGHER," or

"THE ENGINEERS: THEY HAVE NO FEARS,"

what would be your reaction?

My guess is that you'd have to be slightly less than human not to enjoy a situation of being courted—the feeling that you're wanted and needed.

If, however, you are a graduate engineer a decade or so out of college you're possibly experiencing a feeling of frustration brought on by the realization that, in many instances, financially you're treading water.

American industry has awakened to the fact that technically trained minds cannot be turned out by automation and that technical progress, without the regular addition of new and fresh minds, slowly grinds to a halt. The beneficiaries of this, today's engineering college graduates, find themselves riding the crest without having the background of employment experience to adequately evaluate it.

Today there are more companies (especially those interested in engineering graduates) in the business of college recruiting than there were a short dozen years ago. The increase in company recruiting on an organized basis at Illinois Institute of Technology, which has always had a most favorable relationship with industry, is something in the neighborhood of 400%.

Recruitment, once almost exclusively limited to the months of April and May, goes on at my college, Illinois Institute of Technology, for five months out of the year. This amounts to approximately two-and-one-half months for each class during the fall and spring of each year. With some seven companies per day interviewing, the average number of interviews per man has been from six to eight.

Fair Play Needed

A popular misconception is that engineering college recruitment, or college recruitment in general, is a simple thing, it is an art. This is borne out by the statements of companies who have been in the field for nearly half a century.

The are a few companies who will make every possible inducement to the graduate as a means of fulfilling quotas. This will be

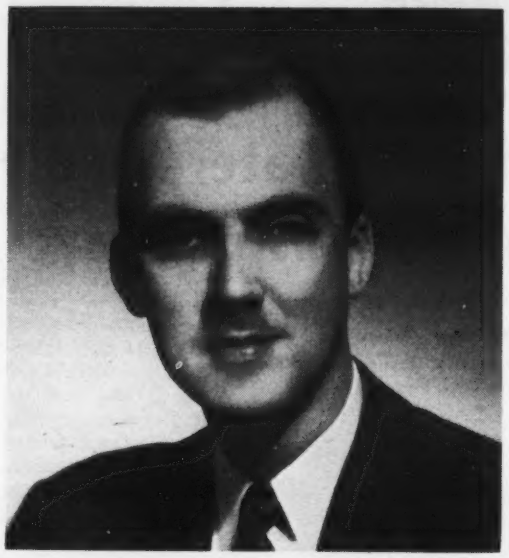
". . . there are a few companies who make every possible inducement to the graduate to fill quotas"

done regardless of future disillusionment on the part of the graduate and the mortality rate that the company is almost certain to have because of such policies. At the opposite end of the spectrum is the ultra-conservative organization that feels, or at least implies, that it is an honor to be asked to work for them. In the end, neither of these approaches will succeed.

We've had, as have other colleges, company planes come to the city to pick up graduating seniors for a plant visit; we've had offers of entertainment made to the graduates. Efforts have been made, unsuccessfully, to bypass our placement service. Sharp practices do not pass unnoticed and are generally not successful. We have the most cordial relations with hundreds of companies. These relations have been in existence, in some instances, for over forty years. We welcome assisting other companies wishing to enter the field of college recruiting if they are willing to play the game according to the ground rules.

Companies that have considered college recruiting a normal activity for some time have little or no disagreement with placement operations of colleges and universities. Mutual understanding of each other's position has created a most satisfactory program for the benefit of the graduate. However, the recruitment methods of some companies fall considerably short of the ideal. Their objectives are not even clearly defined in their own minds!

". . . recruitment methods of some companies fall considerably short of the ideal"



EARL C. KUBICEK has been Director of Alumni Relations and Placement, Illinois Institute of Technology, Chicago, Illinois, since 1948. The school has had almost 8000 graduates during that time, 5500 of which have been engineers. Recruitment goes on five months out of the year at Illinois Tech. with about seven companies per day interviewing.

Mr. Kubicek received his B. S. Degree in Architecture from, the Armour Institute of Technology in 1933. He did advanced work in Air Conditioning Engineering at Armour Tech from 1934 to 1935. After about a dozen years in sales he was appointed Executive-Secretary of the Illinois Tech Alumni Association in 1946. As a member of various fraternal and civic organizations, he was awarded the "Key Award" by the Chicago Junior Association of Commerce for civic activities while a director of that organization.

Under these circumstances, very little understanding is possible concerning ethical approaches to valid recruitment. Representatives of these companies have not been wisely selected for the important job of recruiting personnel who might, at some future date, be in a position to dictate the policies of the company.

This type of recruiter does not have the ability to project either his own personality or an appealing picture of the organization he is trying to sell. These companies do not recognize that, *on campus, the company representative is the company!*

Most of these organizations have not troubled to consult with experienced people in the field of college recruitment, such as engineering college placement officers. They are often operating with little or no knowledge of practices which have been tried and discarded for good and sufficient reasons. They seldom worry about ethics, and will attempt to establish situations most favorable to themselves with little or no regard for their competitors working under the established ground rules.

Many of these companies will enter what is essentially a new field without any research. They would never think of opening a new product line without serious consideration as to its potentials and possibilities. College recruitment is a field in which frustration is brought about by lack of understanding of human motivation. Failure on the part of these companies to have successful recruitment programs will usually be placed upon everyone from the college placement office to the student — but rarely upon themselves.

Plan for Regular Recruitment

Companies successful in college recruitment learned long ago that consistency is more than good business practice and a virtue — it's a necessity. Consistency means recruiting during the "lean" as well as the "fat" years in business. There is always some mortality in company staffs, and if the organization is growing, there will be some need of new personnel. Hence it is logical to plan for a regular recruitment program in the college area, even if it is within certain proscribed limits.

A sales program, in order to be effective, requires cultivation. Is the matter of introducing new personnel into an organization any different? Consistency in college recruiting is being recognized as the secret of success, rather than attempts to lure or coerce graduates and faculty.

In 1955, according to the most reliable figures currently available, there were some 24,000 engineering graduates from all of the accredited engineering colleges and universities throughout the country. The Engineering Manpower Commission estimated the needs for new engineers, both civilian and military, at between 45,000 and 70,000.

In 1958, colleges and universities expect to graduate about 28,000 engineers with BS degrees in all phases of engineering. This figure will mount to about 31,000 in 1960 and about 35,000 in 1964. In view of these studies, "skip-interviewing" becomes a foolish form of dollar saving. The direct opposite of consistency, which is the keynote of good salesmanship, it is certainly not a policy to be admired.

Interview Preparation

If we accept the principle that consistency in college recruiting is basic — what about recruiting practices? Obviously the college graduate wants to know about the company, its possibili-

Turn to page 291

Tidewater's Delaware refinery — largest ever built at one time — will use nearly half as much cooling water as the entire city of New York. Nine vertical pumps and auxiliary equipment keep the refinery on stream by . . .

assuring dependable water supply of half-billion gallons per day

GORDON WEYERMULLER, Associate Editor
With **JOHN SEARL** Supervisor of Utilities & Sulfur Recovery
Tidewater Oil Company, Delaware Refinery

All photos by C P staff except Fig. 3

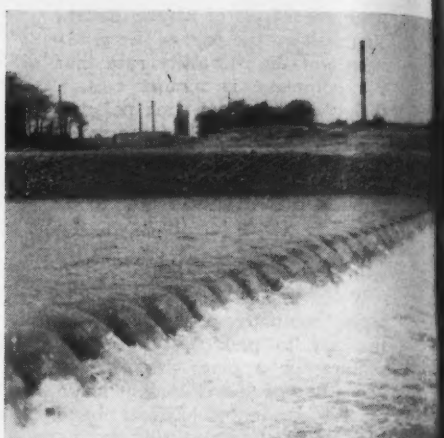


Fig. 1—Tremendous volume of cooling water used, leaves refinery in a pure state. When this picture was taken, five of the nine pumps were operating

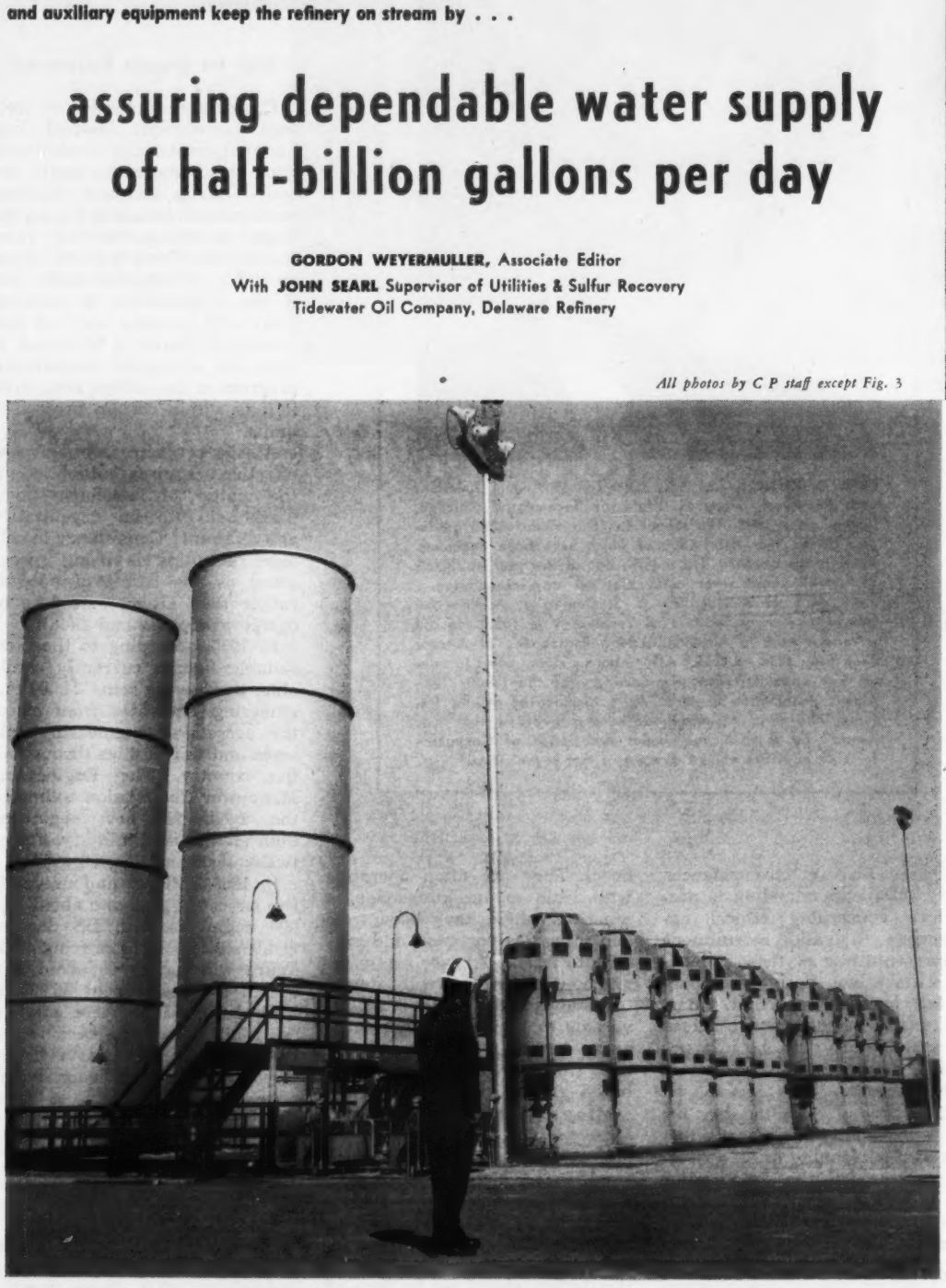


Fig. 2—Nine vertical pumps are believed to be the largest of this type ever built. Each one delivers 34,375 gpm of water at 184' head. Water tanks at left protect concrete pipelines from back-pressure that would develop if pumps stopped with valves still open

PROBLEM: When the new Tidewater refinery 15 miles south of Wilmington was being planned, provision had to be made to assure a constant and dependable supply of the huge volume (396 million gpd) of cooling water needed. This is nearly half as much as is used in a day by the entire city of New York and its more than eight million people (Fig. 1).

Water supply system was a key factor in the successful operation of the refinery since almost all processes would shut down immediately if the cooling water supply should fail. All debris and foreign matter had to be removed from water prior to use in plant. Water had to be returned to Delaware River in a clean state to avoid contamination of the river. Safety was also an important consideration in design of the electrical equipment, to avoid possible hazard where explosive vapors might be present.

Largest and most modern ever constructed at one time, the refinery, which recently went on stream, cost a hundred million dollars and has a capacity of 130,000 bbl per day. It will produce about 10% of all the gaso-

line and other petroleum products used in the Middle Atlantic States.

Solution: Water system as planned and installed has nine vertical centrifugal pumps (Fig. 2), which are believed to be the largest turbine type ever built. Water is drawn from the mouth of Cedar Creek, where it enters the Delaware River. Intake channel is a mile and a half long, 475′ wide at surface, and 40′ deep. Water passes through a trash rake as it enters six 8 x 8′ doors on bottom of channel. Water is taken from bottom to assure that the coolest water possible enters system. Pumping station is in three bays.

Water is first chlorinated to one ppm residual chlorine to inhibit growth of algae, slime, and barnacles on heat exchanger surfaces. Chlorine is received in tank-car lots and piped ¼ mile to the intake site.

After chlorination, water passes through nine traveling screens (Fig. 3) — where fish, weeds, sticks, and other debris are removed. Each unit consists of a moving panel of ¼″-opening wire screen, which extends about 30′ below surface of ground. As each panel in its upward travel carries refuse from the channel, it is thoroughly washed off by means of a high-pressure water spray directed through the screen from the downstream side of the basket. All refuse is flushed into a trough for removal before the basket turns over the head shaft and again enters the influent channel. Screens operate automatically, start themselves up.

After screening, water enters eight of the nine two-stage vertical centrifugal pumps, one serving as a spare. Each delivers 34,375 gpm of water at 184′ head. Since water to be handled varies from fresh to brackish, containing up to 300-400 ppm total solids, pump parts — including impeller, pump cases, shaft, and column — were constructed of stainless steel. Pumps can be run backwards if it is desired to drain system. They can do this because of the pressure head on the pumps, not by applying power to the motors.

An interesting sidelight of project is that engineering plans for pumping setup were made by constructing a model system with small pumps at the Los Angeles laboratory of pump manufacturer. In this manner, tests were made a year or so before installation. These tests included analysis of water flow, swirling, effect of opening or closing entrance gates, possible concrete cavitation, permissible minimum water level, effects of high tide, and arrangement of intake gates and screens.

Each of the nine pumps is driven by a vertical 2000-hp electric motor which operates at 595 rpm. Standard practice has been to select weather-protected motors for installations such as this. However, operating experience of the Tidewater engineers led them to prefer a totally-enclosed motor, preferably a forced-air-cooled design. Because of the size and weight of the housing required — which had to be entirely supported by the pump — design engineers found this was impractical. On this basis, totally-enclosed fan-cooled motors were installed.

The nine motor and pump units are serviced by three independent substations. Each substation is, in turn, serviced by two independent 13,800 v circuits — each circuit following a widely varying route from power source, the Delaware Power & Light Co. Each circuit goes to a separate bus in power station. Hence, every precaution was taken to avoid shutdown of pumps — and of the refinery — through a power failure.

Switchgear for pumps are installed in a pressurized building (Fig. 4) — with air drawn into it through a duct extending above roof where there is less liklihood of explosive vapors existing. Vapor seal built into all bus ducts entering switch house minimizes possible hazard.

Check valves on pumps are hydraulic, piston-operated butterfly valves (Fig. 5), which close on power failure to any individual pump. They also double as shutoff valves. Valves can be operated and held in any position by manual control of oil to power piston.

Each butterfly valve is 36″ pipe size, with 125-lb cast iron body,

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Fig. 3—Traveling screens are like an iceberg, 90% being below the surface. Units extend 30′ down to bottom of channel

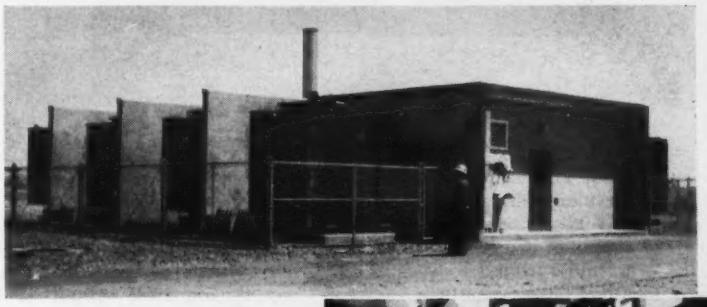


Fig. 4—Switchgear for pumps are installed in pressurized building and vapor seal is built into all bus ducts entering switch house to minimize hazard. Transformers are on outside

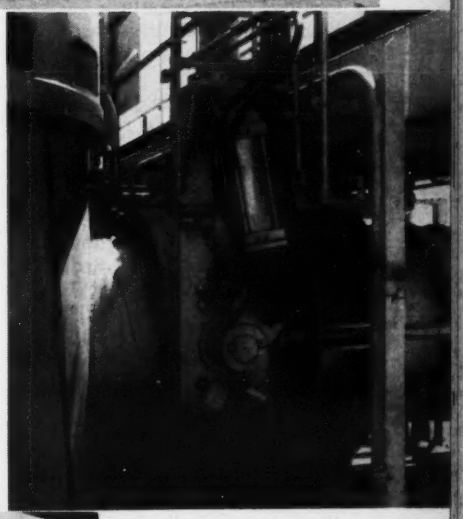
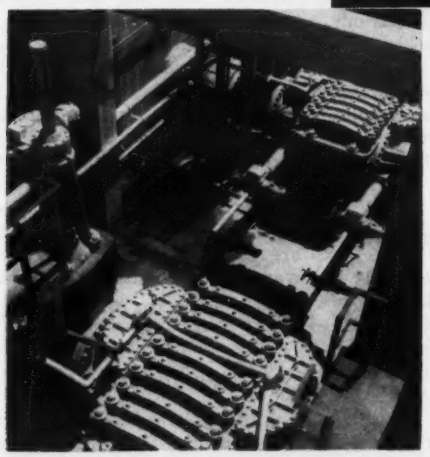
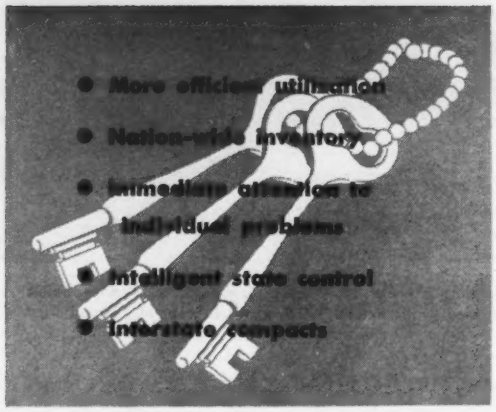


Fig. 5—Butterfly valve on each pump automatically closes in case of power failure

Fig. 6—Twin-basket strainers remove contaminants from water just before it enters each refining unit. Note large concrete pipe coming in at top left





Keys to ample ground water for the future

ALBERT G. FIEDLER, Assistant Chief
Ground Water Branch
US Geological Survey
Washington, DC

ALBERT G. FIEDLER, Assistant Chief of the Geological Survey's Ground Water Branch, joined this branch of the Department of the Interior in 1918, after graduating from the engineering school of Pennsylvania State University.

His life work has been the study of surface-water and ground-water resources throughout the country and the administration of programs of ground-water investigation conducted by the Survey.

He is an authority on ground-water resources, well construction, and legal control of ground water use.

As industrial and population centers grow and demand for water increases, we find that our nation is approaching the limit of supply of good industrial water from underground sources in one locality after another, even though in other localities, huge underground reservoirs remain to be tapped.

More and more we see examples that make us realize there is no such thing as an "inexhaustible" supply of potable water. It is very important that we take a long look at our nation's water inventory and the efficiency with which we are using it.

We must make better use of our available water supply, and wisely plan its conservation so that it can meet these ever increasing demands.

Our national water supply is not diminishing. There are wet and dry cycles which last from a few years to hundreds, but there are no indications that our country — or the world — is gradually drying up.

When we expand our water uses during normal or wet spells, we compound the troubles that come with the inevitable dry spells.

Importance of Ground Water

Access to ground water is a big factor in decentralization of industry, the growth of suburbs, and in irrigation of farm land.

Last year 9000 well-drilling contractors, employing 50,000 men, constructed half a million wells for which they charged half a billion dollars. Today, 13½ million wells are in use — by 1975 the number may reach 16 million.

Our nation used over 220 billion gallons of fresh water each day during 1955. About 45 billion gallons (20%) came from underground sources. By 1975, wells may be supplying 69 billion gpd.

Development of ground-water sources — and dependence on them — has brought on the danger that there will not be enough low-cost water of the right quality or temperature at the desired locations.

For instance, we are approaching the limit of practical irrigation in the West — and yet only 2 to 3% of the total area is irrigated. New irrigation projects of the Reclamation Bureau are not even counterbalancing retirement of currently irrigated land as water sources dry up, soil becomes depleted, and city and highway construction expand.

Throughout our country, these and other causes have snatched 5½ million acres from farm use in just the last three years. Reclamation has added only 300,000 acres during this same period, and this all in the West.

Let's look at what is happening in three important areas that are so close to large bodies of water, or have such a humid climate, that a water shortage might seem impossible.

New York City Area

Although the bulk of the city's water comes from upstate surface reservoirs, a large share of the water in Brooklyn, Queens, and other parts of Long Island comes from wells.

Most of the island is formed from a sandy glacial drift. This formation, 1400 square miles in area, is recharged by precipitation at an average rate of about one million gallons per day per square mile. Because of the possibility of sea-water contamination, however, about half the present supply is pumped from deeper strata which are only slowly recharged by rain water.

Because of pumping, the water table in Brooklyn had dropped below sea level by the late twenties. Sea-water started to encroach.

In the early thirties, the state began to control water pumping in this area. To conserve water, it required that ground water used for air conditioning and not contaminated, be returned to the sands. In addition, most of the public water wells in Brooklyn and Queens have been closed off and upstate water is being pumped in.

As a result, the Brooklyn water table has recovered and salt water encroachment is no longer threatening. Because of the increasing demands for low-cost industrial water, this area will have to be closely watched to make sure the situation doesn't retrogress.

In Nassau and Suffolk Counties to the East, ground-water pumping has increased. Care must be exercised here too, especially since the island is surrounded by salt water that will move inland as the water table is lowered.

Chicago Area

The area formed by major portions of Minnesota, Wisconsin, Iowa and northern Illinois is underlain at depth by artesian sandstones that are harder, older, less permeable, and have poorer storage characteristics than the sands under Long Island.

In places these sandstones are a thousand feet thick. Although they are no longer used as prime sources of public water in the large areas (Chicago, Milwaukee, St. Paul-Minneapolis), wells are pumped heavily for industrial use and for public water in numerous suburban communities and

smaller cities.

Most areas of heavy pumping are some distances from principal areas of recharge. Thus water levels have declined greatly since the early days — by hundreds of feet in many places.

Luckily, the sandstones lie deeper than the pumping level, and water can still be pumped in the heavily developed areas, but from depths of many hundreds of feet.

Then too, other sources of water may be found in less extensive water-bearing formations which have not yet been developed. But in the long run, demand is outstripping the rate at which recharge to these formations can reach the areas of heavy demand.

Miami Area

Miami, Florida, is an area that is about as humid as any in the East, and has some of the most productive water-bearing strata in the world — yet if water is pumped needlessly, the area could get into trouble.

Although the annual rainfall is about 60 inches, the climate is warm and much water is lost by evapotranspiration (the combination of direct evaporation and the use of water by plants). Nevertheless, the underlying rocks are so permeable that they absorb much of the water before it can evaporate.

This ground-water source was once so full that springs discharged along the ocean and many of the first wells near the shore could be pumped at thousands of gallons per minute. What then could cause the present problem?

Since the early days, drainage canals have been dug to make the land suitable for development. These canals have lowered the water table to such an extent that salt water is moving inland on a broad front along the shore and in underground tongues along the canals.

During a dry spell in 1939, sea-water flowed up the Miami canal and entered some

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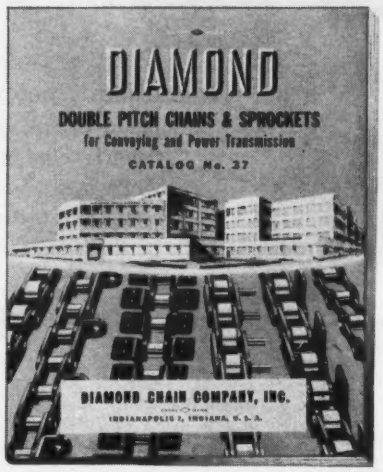

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For Men Who Manage SEPTEMBER 1957

chemical processing

instrumentation and control

HIGHLIGHTS

Controlling internal temperatures on rotating kiln Page 61

Flow ratio proportioning maintains process continuity Page 64

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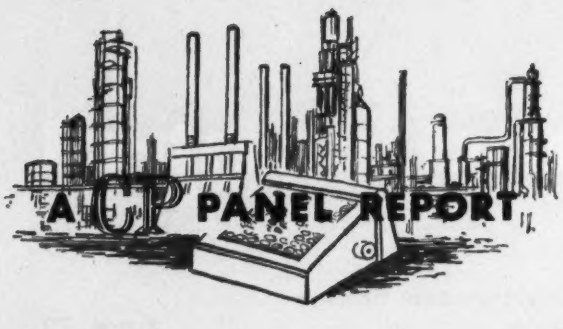
Valve power needs cut 90 per cent Page 74

Thermocouple maintenance reduced drastically Page 76

"Plant-tested" chromatographic analyzer developed Page 82

Nomography—Graphical means for computation Page 89

What you — as a management team member — ought to know about



The Automatic Pro

Management's stake in today's advanced control techniques can be the company's entire profits over a period of years . . . and gain or loss of industrial leadership

JOHN DIEBOLD (MODERATOR): Very few fields have grown as rapidly or are as important as automatic process control, yet include so much confusion and nebulous thinking. Many people assume the reason for the automatic plant is labor saving, rather than yield improvement, saving in raw material, improved quality and uniformity in the end products. Even some well-known industrial spokesmen have hazy ideas about management's objectives in furthering the "automatic processing plant."

JACK FROST: Doesn't the word "plant" have to be defined? In other words, the process requirements may be as simple as a substation, controlled by devices remote from the plant. In other situations, remote control might not be possible.

Differences between plants with a variety of outputs and those producing the same product continuously will affect the definition of what is an automatic processing plant.

ALBERT SPERRY: We should confine our discussion to the conversion plant—as has been suggested by Vince Riggio. Here is where we differ from the automobile industry. The "Detroit-type" automation, which is getting all this publicity, is mainly involved with transporting material from one machine to another—making manufacturing continuous. We take for granted that the transportation of material being processed. We got rid of that problem twenty-five years ago.

I always use "automatic" in quotation marks. I don't think the ideal of an automatic *manless* plant will *ever* be reached.

To my mind, a plant where top management makes all decisions for what happens can be called an automatic processing plant. This is a practical definition.

Objectives

DIEBOLD: Is labor saving the primary objective of an automated plant?

RALPH WEBB: Labor saving is not

Sponsored by CHEMICAL PROCESSING Magazine a panel discussion was held by more than twenty of the nation's top experts on instrumentation and data reduction — to clarify policy objectives and management considerations in achieving the "automatic processing plant."

Here's what the panel members said concerning the automatic processing plant. Comments were made on: What are the reasons for it? Is labor saving the primary objective? Even . . . what is an automatic processing plant? And . . . what is management's stake in today's control methods?

This is what was discussed — briefed and excerpted.

Processing Plant 'How and When'

the primary objective in engineering an automatic processing plant. It may be an incidental result, but it is not the primary reason.

PORTER HART: Safety is first. We engineer instrumentation systems so men do not have to enter hazardous areas. Product quality is number two. Increasing the productivity of men is number three.

VINCENT RIGGO: Even if all the operators were eliminated in an automatic processing plant, the labor force would be reduced only about 20%. I doubt if the payout would be financially possible based on labor savings.

JOHN JOHNSTON: An important reason for extensive automatic control is that it helps to preserve continuity of operation and improve the dependability of equipment—to keep a "run" going six months or more without a shut-down.

V. V. TIVY: Isn't it reasonable to use a sociological objective in attaining the automatic processing plant? Use a man to do the things a man is good at doing. To think, rather than look at a dial. Automatic equipment should be used for dull, routine operations. Leave to man the job of thinking—which a machine cannot possibly do. This seems a more laudable objective than simply making money.

E. S. BALE: It seems to me in this discussion on objectives that an appropriate question can be: Is there any difference between the objectives of an automatic processing plant and the objectives of the business itself. The most important secondary objective of a business, necessary to all the primary objectives, is to operate at a profit and generate capital which, in turn, is fed back into the system.

When it comes to manpower, the non-routine activities, the non-repetitive things that have to be done set the manpower requirement. In staffing plants and process operations, it is not the regular expected adjustments that set the manpower needs. The emergencies, the irregular, the unexpected times when instruments fail, the introduction of some new variable into the process determine the manpower requirement.

IRA LOMAN: Are there not some processes which cannot be controlled manually? Is it not more economical in such cases to control them automatically?

HART: Exactly. The sea water bromine process is an example of one which could not be controlled manually. Practically all chemical plants today are in this same class. And also, an operation has to be continuous to be economical—which again requires automatic operation.

Process Research

H. GROHSKOPF: One of the real problems of the chemical indus-

Panelist Albert Sperry listens intently as panel moderator John Diebold and John Vaaler confer. Diebold, internationally-known for his work on problems of automatic control, and Al Sperry of Panellit sparked the day-long discussion

AUTOMATIC PLANT

A CP PANEL REPORT

try has been its inability to predetermine optimal product cost before a process is off the drawing boards.

Du Pont, for example, recently published details of a computer-based mathematical study which showed how capacity of a continuous process could be increased 30%.

This slack in the use of capacity is, I am certain, common throughout the chemical industry. I don't think the industry can afford it. I know that this kind of slack is not compatible with the thorough process knowledge needed for the automatic processing plant.

LOMAN: I have the impression that the chemical industry has devoted a great deal of research to processes and not too much to automatic control. I suppose the economic reason for this is that there is more pay-off in process research.

IVAN THOMAS: I have an impression which is definitely the opposite. With development of more process information, demand for automatic control has been increased. To keep up the pace, the plants must be controlled automatically.

DIEBOLD: Does this mean that we need computers or a higher degree of automatic control?

GROHSKOPF: Essentially, we need a formulation of what the process wants—to use Porter Hart's phrase—in terms that a computer can use. We need knowledge of how a process reacts to changes in concentration, temperature, and so on. Then the problem is productivity per dollar of operating cost after allowance for investment.

End-Point Analyzers

HART: My thinking is that our money is better spent now on stream analysis than on automatic plants. We need continuous analyses of the product stream to learn "what the process wants." Since a chemical plant has a "nervous system," it is very difficult to build a new plant and instrumentize it correctly. It is for this reason that we need stream analyzers. We cannot take any chances of the plant not going "on stream."

BALE: There has been too much technical intrigue about these complicated systems of control. Some of them have been promoted because of their novelty. We would prefer to make an orderly advance.

JAMES MCDONALD: We have information systems, not end-point control—so the operator will run the unit instead of the unit running him.

We have one master computer at Tidewater's new plant and we would like to use more. However, we are starting on the ground floor. By using information systems—with data logging—we have all our signals coming in. We intend to study the use of those signals.

DIEBOLD: In discussing the direction in which we are going today in process control, I think a logical question is: What will the role be of analog control versus digital control?

SPERRY: I lean toward the idea that the closer the control points are to the variables themselves, the more likely will the analog computer be used. The digital computer will be used for the more complex relationships and larger decisions.

Picture this. If a flow rate were compensated for temperature using digital methods, the computations would require a tremendous volume of stored data. But if the computation is made right at the point of input, only the completed result is stored.

JACK ROBACK: It is very difficult to say which type of computer will become the prevalent one in processing applications. Each has advantages. I think the answer will be purely a case of economics with consideration being given to the needs of the process being controlled.

JACK BISHOP: The gain or loss of industrial leadership in the next five to ten years could very easily depend upon the courage and leadership exercised by those in chemical and petroleum companies to sell the idea of research on computer applications of automatic process control.

Using These New Techniques

DIEBOLD: Automation is not always all that it may seem to be. So much glamour attaches to automation that much pressure exists within companies to be doing something about it. A brief perusal of this year's crop of financial reports readily attests the pride of activity in the field of automation and computers. As a result of this pressure to keep up with one's corporate neighbor—in real fact as well as prestige—some pretty elaborate organizational devices have been employed to achieve as rapidly as possible the benefits of automation.

To what extent has such activity—"automation committees," "automation department," "automation coordinators"—been successful? Do such special organizational devices really speed progress, or do they conflict with the normal smooth functioning of instrument departments? Do "automation committees" present a facade of activity but in practice postpone real decisions? Or, does automation really require a unique combination of specialties, wide scope in planning and system design, and hence a special administrative structure?

What is the administrative structure that will make best use of these new techniques?

JAMES MCDONALD: It has to start from the top down, as we all

know. As safety within an organization starts with the board of directors and works its way through the organization, the design of the so-called automated plant literally has to start with the chairman of the board.

In any company, resistance at the upper levels will stall the trend toward best use of instrument techniques.

We have been fortunate at Tidewater. In the design of our new plant, our president demanded that we make full use of every possible instrumentation technique. So the answer to this problem lies with top management.

The real solution is to have top management aware of the problem, recognizing the automated plant is close in the future, and that it is up to them to secure it. Things happen only when the order comes from the top—"Put it in and make it work."

DIEBOLD: Where should the instrumentation or control group be in the organizational structure? Should the group charged with application of control be separate and distinct from the normal instrumentation group?

MCDONALD: Top management must set up a committee, or designate certain persons, with responsibility to top management. For example, the Texas Company has a Director of Automation who reports at a very high level.

SPERRY: How about an Operations Research group? Or would it require one within an instrumentation organization, reporting to top management in either case?

MCDONALD: A combination of the two would be better. It should not be "just another instrument group." But it must report to top management.

H. GROHSKOPF: Unfortunately, an Operations Research group optimizes an existing system. Most O. R. groups do not go too deeply into whether the operation is correct. The system is accepted—as what is possible.

DR. CUTHBERT HURD: The Instrument Society of America has come to the realization that it is of extreme importance for top management to know about capabilities of instrument systems. During the fall meeting of the Society in Cleveland, the Society has scheduled a special session for top management to discuss instrument potentialities and possibilities.

Secondly, there is another analogy between automated processing plants and automated data handling systems. The decisions made by the management group on data processing systems — as which one, how fast to apply it, the training and relocation of people, what problems to put on first — can actually affect profits of a corporation for a year, or perhaps several years. A large company can make a multi-million dollar investment in a data processing system.

This same reasoning applies, perhaps even stronger, in changing methods of control in a plant. *These must be top level decisions, including the Board of Directors.*

To answer the question — in some way the organization must be such that the Board of Directors, who cannot be expected to know in detail the various problems, must be aware of the facts, including the implication that the profit structure may be changed for a period of years. We all hope this profit structure will be improved, of course.

IVAN THOMAS: The position of such an organization, whether a combination of instrument and system analysis teams, or an Operations Research group, should be flexible. The group should be free to work in all phases of research, development, and engineering, yet be responsible to a high level of management. It cannot be stymied. It must have adequate liaison and feed-back from operating groups to keep a finger on the pulse of the plants.

DIEBOLD: Isn't this the case in most of the processing companies at the present time?

THOMAS: I think the trend is that way.

MCDONALD: What is needed in this group is stature. Most companies are prone to follow an established pattern. If a new problem is to be studied, management looks around for the man most easily spared. Usually, this man is relatively new to the company, or perhaps does not fit into his present position.

The man selected joins the

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E. S. Bale, Chief Operations Staff The Standard Oil Company of Ohio

John F. Bishop General Mgr. Beckman Instruments, Inc.

John Diebold John Diebold & Associates, Inc.

H. C. Frost Asst. Chief Engr. Corn Products Refining Co.

Philip Gilman Ind. Sales Dept. Taylor Instrument Companies

H. Grohskopf, Mgr. Operational Statistics Dept. American Cyanamid Co.

H. M. Hoover Application Engr. The Bristol Co.

Dr. C. Hurd, Director of Automation Research International Business Machines Corp.

Porter Hart, Supt., Instrument Technical Services Dow Chemical Co.

John Johnston, Supervisor Engineering Dept. E. I. du Pont de Nemours and Co., Inc.

Ira Loman, Mgr. Engineering Planning International Business Machines Corp.

John W. O'Hara, Asst. Div. Mgr. Systems Engineering Div. Brown Instrument Div. Minneapolis-Honeywell Regulator Co.

Vincent Riggio U. S. Industrial Chemicals Co. Div. National Distillers and Chemical Corp.

James McDonald, Asst. Mgr. Delaware Refinery Tidewater Oil Co.

Jack G. Reback Engineering Mgr. Data Reduction and Automation Division Fischer & Porter Co.

D. C. Sanford, Mgr. Application Engineering The Bristol Co.

E. I. Thomas Chief Instrument Engineer Union Carbide Chemicals Co., Div., Union Carbide Corp.

V. V. Tivy, Mgr. Systems Engineering The Foxboro Co.

Albert Sperry President Panellit, Inc.

Ralph Webb Director of Instrumentation Union Carbide Chemicals Co., Div. Union Carbide Corp.

W. J. Wixson Asst. Gen'l Supt. Semet-Solvay Division Allied Chemical & Dye Corp.

THE AUTOMATIC PLANT — *A CP Panel Report*

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committee. Immediately, all the "armor plate" goes up. Everyone puts up a shield against the idea.

The way to lick this — we did it in our case — is to take people out of operations where they naturally want to stay, and "stick" them with a problem. They would like to solve the problem and get back to what they were doing. There is no substitute for that desire.

The objective is to have top management's blessings, place the problem in the hands of a committee reporting high on the management ladder, put some responsible people on the comittee, and let it go into high gear.

PHILIP GILMAN: Isn't there pressure on top management of many companies to be first among their competitors to use new equipment? Many companies, as users are most interested in publicizing the fact to their customers that they are up to date, putting pressure on their competitors.

"Spreading The Word"

DIEBOLD: To have any progress at all in the area of computer control, it is necessary that there be fairly wide spread and detailed knowledge within user firms concerning the manner in which computers can be used to solve processing problems.

What about the most fundamental problem of all, the problem of education in the new techniques? What about training the people in the potential of computers and in what is available, including techniques used by other people? This would also include application within other parts of their own firms.

E. S. BALE: Training boils down to certain definite things. First is the matter of attitude. However organized, the training program must create the right attitude in both the operator and the executive who has to approve the estimate. This attitude becomes particularly important in relation to points of decision.

Points of decision differ with different companies. In some, top executives are concerned only with major factors. What will this particular installation accomplish? How much will it cost? Executives in other companies are concerned with details of installation. They will insist on examining all details, even to use of a certain make of instrument. Different levels of decision have to be identified.

Most important, the organization that is set up and its connected activities must be real. It cannot be organized to impress someone in the organization. This will come out in the wash sooner or later. There is a day of reckoning for any artificial organization.

Frequently, organizations on a top executive level for handling detailed aspects of an installation are susceptible to this weakness, because people involved do not have to examine the realities of the questions.

So if the organization is adapted for three things, attitude, placing decisions on the proper level, and a real purpose in being organized, the organization will succeed.

JOHN W. O'HARA: Since the cost of instrumentation systems is increasing today as it is, the level at which approval is obtained in management is becoming higher and higher—simply because dollar volume is growing. A higher level of education is required in the upper management echelons concerning these new developments so management will feel confident in their decisions.

Justifying The Investment

V. V. TIVY: One of our problems today is defining to top management the returns from an investment in instrumentation. I have formed a very strong impression from what has been said here that industry has a powerful, real need for end-point analyzers. The other impression is that people are groping for justification with which they can approach management for permission to install some of the new devices. Engineers are anxious to hear how others prove to management that they should buy the new automatic machinery. Everyone is agreed that some sort of automated plant not generally used today will be here in three or four years. But how to justify it seems to be the kernel. If among ourselves we cannot come up with a clear justification, it is hard to see how one can approach management and say "This is what I want to buy" when payoff cannot be pinpointed. We can talk about better quality, better product, but it is not too clear how this is to be proved.

JACK BISHOP: I'd like to takeoff on that question. It reminds me of thinking twenty or thirty years ago regarding research. How to justify research? This program of instrumentation must be looked upon by top management as a research program. Labor saving will never justify an automatic data system. But there are great returns possible, although we do not know what they are anymore than what the results will be of a research program before the money is spent.

Four of the key experts in instrumentation field who attended the CP panel. Left to right are Wixson, Tivy, O'Hara, and Riggio. John O'Hara is jotting down a note for later comment

SPERRY: Consider the time delay involved. This entire program of instrumentation and instrument development has happened very quickly in the process industry. The computer people have been very well aware of this in scientific fields and in office equipment work, but in the plants a unit cannot be purchased and be installed in a month. Isn't that right, DR. HURD.

DR. HURD: Two and a half years is a good time.

SPERRY: That is not a long period to develop a computer program. It takes that long to learn how to use a data processing machine. My opinion is that management's incentive is already there. During the past two and a half years most companies have seen the introduction of computer methods. During the next two and a half years almost all large companies will say, "We have some experience with this; we are going to use this to its fullest extent. But it will take another two or three years to do it the way we wish." During the next five years there is going to be a tremendous number of additional instruments developed to compliment the computer for use in industrial control fields.

Practically every large corporation is thinking in these terms and buying equipment to do this. They may not buy all equipment necessary at one time, but the important point is that management already has approved the step.

MCDONALD: We have the same problem. Whenever we buy anything, we make out an application for expenditure. Down at the bottom of the sheet it says, "Please state pay-out on this equipment in number of years." Often, it is difficult to develop the information. A judgment approach solves the problem.

Here's how the approach is used: A new instrument is introduced. The engineer decides that the instrument can work. Based on its cost and the problem that it can solve, the engineer can conceive of the instrument working and doing the job. If the instrument doesn't cost too much, under $5000 or $6000, it may be possible to get it.

If every expenditure had to be justified on the basis of "payout," we might still be back in the 1800's. The dollars and cents

approach has to be ruled out sometimes for lack of information.

GROSHKOPF: May I suggest a method to handle this question of pay-off? The average chemical company, today, can field a team of specialists—chemical engineers, a physical chemist, a process mathematician, instrument engineer, electronic control engineer—as a team to study a specific process. If there are gaps in process knowledge, throw the process back on the bench for rate constants necessary.

After an input-output study has been made, estimates can be developed as to what would happen, for example, if a limitation on heat transfer capacity were removed. Then estimates can be made as to how critical the control points are and what the projected capacity would be under different control models. I believe this would allow the development of reliable "payoff" estimates.

The difficulty is fielding this type of team for the length of time necessary. It might take 12 to 24 months of concentrated effort. But I believe this essential to put a hard dollar base on an estimate.

It is in production research that the effort is most necessary. The cost might be two to four hundred thousand dollars. The process may have to be "piloted" again. Sometimes in the haste to get on the market, certain facts are glossed over. But those details must be learned. The engineer must know the process.

What does the reaction want? What does the process need? Then dollars can be placed on the result. This takes faith on the part of management because development dollars are required over a period of months.

DR. HURD: This is an interesting speculation. I believe the estimate—about $300,000—is low. Aren't there many companies who have spent much more than $300,000 trying to describe a process—without success?

DIEBOLD: Could you give us some price tags based on your company's experience, Dr. Hurd?

DR. HURD: During the past five years we have been through the process of introducing radically-different kinds of equipment. One of the greatest obstacles we overcame was underestimating the amount of money needed for research and development to describe a process sufficiently well to use a data processing system. I think two or three hundred thousand dollars is very low for any important process. Possibly over a million dollars could be spent on research and development in some cases . . . and still not describe the process.

GROHSKOPF: I am talking about a process already in production. The problem is to throw light on those areas not previously explored. To get an idea of how the process hangs together and what drives it. I am not talking about the development of a process which might require $2,000,000.

DR. HURD: IBM has been developing machines to be used in automatic assembly of printed circuit cards. We have spent several hundred thousand dollars in developing this technique. We are not yet satisfied.

McDONALD: We (at Tidewater) are going into a facet of the automated plant along the lines of accounting and the controller's functions, plus correlation of market information from crude to the final product. We are assembling a group of twenty to fifty people who are being lifted literaly right out of their jobs. To our surprise, top management demanded immediate release of four of our best people from our new refinery to serve in the group. We were stunned by the request but quickly backed off and said, "We are taking the wrong attitude. If we send someone who can be spared, and who doesn't know anything, then the company will not get anywhere." So we are going along with the request.

The group will, as I said, tie together the whole function of operational control, starting with the controller's office and working down to control the refinery operations. The group will report to the controller of the company. He, in turn, reports to the senior vice president.

DIEBOLD: What other companies use this approach?

McDONALD: The Atomic Energy Commission, of course, uses this approach every day. The AEC has a group on problems as how much should be produced in which plant.

WALTER J. WIXSON: I do not believe the Semet-Solvay Division is using it.

BALE: We use what we call a "task force" at Standard Oil of Ohio. This is usually a group pulled out of normal assignments to represent different points of view and backgrounds. One group several years ago made a study of our entire package business, dealing with everything that we market in packages. With aid from outside consultants, this group developed new system of refining, scheduling, and physical handling for our packaged products.

We have another currently-active group which works on opportunities in crude, sources of crude supply, how to manufacture finished products at the needed locations.

We have a very small group within our manufacturing department called an "Operations Research" group. This organization works on manufacturing problems, as what can be done to improve departmental safety performances, problems of can manufacturing plant, and so on.

In each case, we use people thoroughly identified with the existing organization, separate them for study of the particular problem, and then hussle them back into their former jobs. Only problems of a defined scope are attacked. After a problem is solved, members return to their former positions.

DIEBOLD: IBM and in particular, Dr. Hurd, has devoted a great deal of effort to the problem of training people to understand how to use computing equipment.

Dr. Hurd. Would you care to make any comments concerning this same problem in the processing industries?

DR. HURD: We try to educate people in the very highest level of management as to what might be expected from the installation of a data processing system. Then we encourage top management to work with us in educating the next level of management. We go right down the line to the people that operate the machines. It is fundamentally important that all levels within a company know about the

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"Safety is first!" . . . says Porter Hart (left) of Dow Chemical Company to E. H. Frost of Corn Products Refining Company

Ralph Webb (left) has just said . . . "Labor saving is not the primary objective in engineering an automatic processing plant."

Taking a short break, panelists Al Sperry and John Diebold huddle to continue their discussion of the automatic processing plant

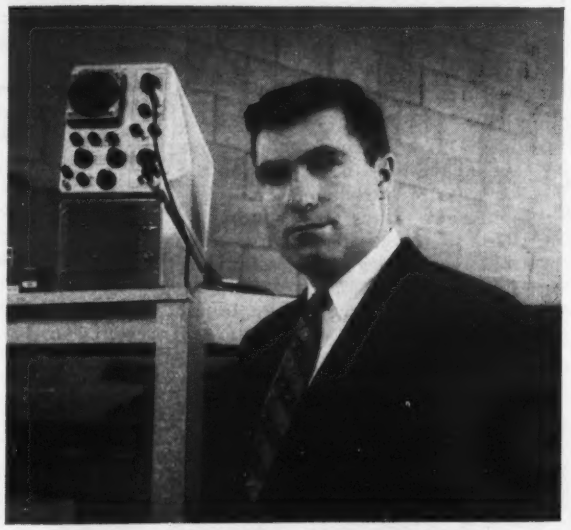
OPERATIONAL INFORMATION SYSTEMS discussed by *Hank Bechard*

Fundamentally, Operational Information Systems are designed to provide immediately available digital information about selected physical phenomena affecting a process. Such information can be related to plant operating efficiency or used continuously to check product specifications. At present such process trend information is computed manually, and results are usually not available for several hours after corrective measures could have been instigated. The design goal is to obtain an information gathering system which will provide data on a real-time basis so that such corrections may be made immediately.

If properly designed, an Operational Information System can be made to provide better process information than is now being obtained by tailoring individual data-collecting systems for each specific function of a process. The versatility achieved with this approach is characterized by the fact that data-handling modifications of the Operational Information System are made possible without having to resort to redesign. Thus, adding to or expanding the System is readily accomplished within the limitations of the computing and memory capacities designed into it. The changes can also be made rapidly without the loss of any information pertaining to the physical phenomena being studied.

The design of a universal system of this type implies functional construction. Its distinctive feature is that it incorporates a specially designed digital computer as the fundamental building block. Analog to digital conversion as well as input scanners and output recording components are then added to it. And in contrast to special purpose computing elements, the Operational Information System features completely flexible internal programming.

In the conventional data-logging system, programming is accomplished by means of an input switching system where an additional contact for each input is needed in conjunction with a patchboard in order to introduce the specific instruction peculiar to the input. In the Operational Information System, pinboards or patchboards—accessories to sequence-scanning devices—are entirely eliminated. Programming is accomplished by punching paper tapes with all the necessary instructions and feeding this information into the computer where it is stored magnetically. The instructions can therefore be varied at any time without making any physical changes to the equipment. A single memory unit is incorporated for all memory requirements such as: scanning sequence, sampling schedules, linearizations, scaling factors, range suppressions, alarm levels, alarm conditions, temperature and pressure values for flow adjustment, computation instructions, etc. Since this memory unit is designed to permit random access, the greatest freedom is available to schedule sampling rates and sequences. For instance, the repetitive scanning of a selected input may be intermingled with single sequential scanning of other inputs.



Henry L. Bechard, administrative engineer, describes Operational Information Systems.

In the Operational Information System all analog voltages are converted to the digital form before any operations whatever are performed upon them. By digitizing the voltages immediately, and not operating upon them in the analog form, inaccuracies introduced by analog computations are completely avoided. This is particularly important in the more intricate computing operations, and guarantees digital accuracy for all operations.

Progressive industrial management has invested in conventional data-logging systems primarily in the interest of gaining experience in this area. Time and again such experience has yielded significant process information leading to improved plant performance and more economical operation, and in scattered cases has even led to minor loop control.

The concept of the Operational Information System capitalizes upon this accumulation of experience gained in data-handling and process control and now, in a single versatile system, takes the boldest step yet forward toward filling industry's ultimate goal of "closing the overall process loop."

By applying the latest proven techniques, our well-qualified staff at Daystrom Systems is prepared to take single responsibility of assembling and installing a system to meet your needs. We are currently compiling a file of new applications and papers on various parts of systems, both industrial and military. If you are interested in receiving the file and periodic additions, please write us.

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An eight-pound dial manometer that has an accuracy of 0.1% checks calibration of pressure and flow recorders and controllers while on-stream. Instrument can also be used as an accurate pressure indicator for industrial and laboratory use.

Other advantages: Checking pressures is easy, safe. Instrument is compact, easy-to-read, and to handle. Dial manometer responds to pressure changes with a sensitivity of 0.01% and 0.1% accuracy.

How it works

Pressure-sensitive element is a beryllium-copper capsule. A movement, which manufacturer says is friction-free, transmits movement of capsule to pointer shaft. Backlash is eliminated by maintaining uniform tension between the geared sector and pinion without using a conventional hairspring.

Only rotating part is pointer shaft, pivoted in a jewel bearing and guided by a hardened sleeve.

Mechanism is in a pressure-tight aluminum housing designed for a maximum static pressure of 35 psi. Instrument has a continuous metal tube between exterior connection and inside of pressure element, providing a leak-tight system.

Temp correction is 0.375%/-10°C ± calibration temp. Minimum range is 0 to 120 inches of water; maximum, 0 to 300 inches of mercury. Measurements can be made of gage or absolute pressures. Most instrument men will find the standard instrument range of 0 to 18 psi or 3 to 15 psi differential or gage pressure very satisfactory.

(Dial manometer is a product of Wallace & Tiernan Inc., Dept. CP, 25 Main St., Belleville, N.J. . . . or for more information check 5485 on form opposite last page.)

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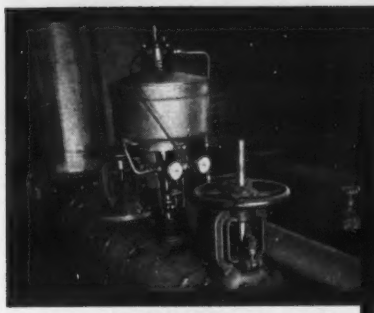
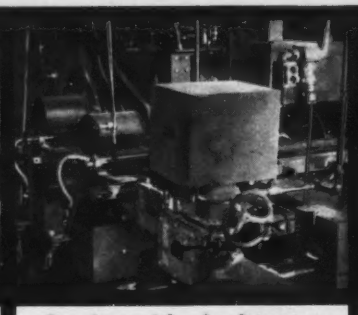


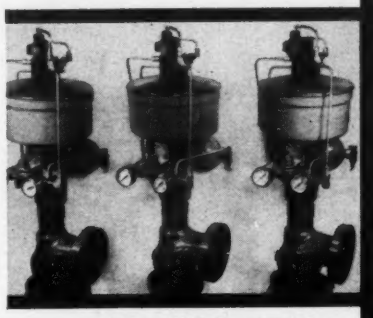
Conoflow LB Valve on a difficult liquid level control job in a Barrett Div. plant of Allied Chemical & Dye Corp. This valve is handling hot coal tar at temperatures to 750° F.

Conoflow Saunders Valves used in conjunction with Fuller Company's Airveyor System in a midwestern cement plant. These close-coupled "on-off" valves are equipped with solenoids and armored position indicators.

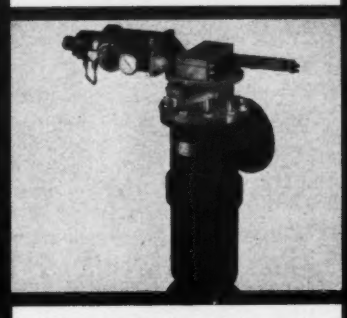


One of several Conoflow Rotomotors on a unique service in Owens-Corning's Newark, Ohio plant. This powerful pneumatic actuator positions a large circular saw which automatically trims and cuts a continuous sheet of Fiberglas into stock widths.

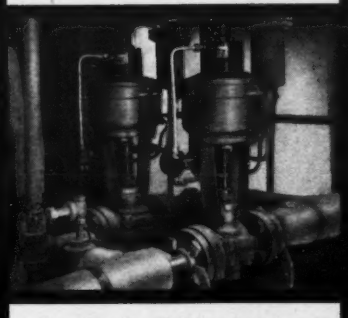
Conoflow Pressure Transmitters for the Kraft Foods Company. They will be used with miniature recorder-controllers to give visual indication and record of levels and pressures in vegetable oil vessels.



These 3" Conoflow "S" Valves are going to the Aluminum Co. of America in the new St. Louis pilot plant. They will be handling hot flashing caustic liquor containing 7% suspended solids with pressure drops up to 300 psi.



Cylinder Conomotor affords remote manual or automatic adjustment of flow rate for a Kates direct-acting flow regulator. This is one of many OEM applications for Conoflow's versatile pneumatic throttling actuator.



These Conoflow LB Valves have been on a tough temperature control service for over three years in the plant of this large manufacturer of floor covering and insulation. More than 600 Conoflow LB Valves are in use throughout this plant.

Conoflow Airpak filter-regulators being tested prior to shipment to duPont. Other large volume Airpak users are: Phillips Petroleum, Leeds & Northrup, Catalytic Construction, Minneapolis-Honeywell, and Fischer & Porter.

While most Conoflow products are shelf items—a good many are not. They are created for the job through our engineering and yours—combined and concentrated on your problem. Shown above are only a few examples of the variety and scope of Conoflow installations. If you are not already a Conoflow customer, phone or write us at 2100 Arch Street, Philadelphia 3, Pa. We'll put you in touch with a Conoflow representative qualified to help you.

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Lithium Corporation's 250-foot rotating kiln could easily develop localized over-heating using only conventional measurements of output and output temperatures. Now . . .

complete temperature profiles reduce possibility of kiln 'hot spots'

WILLIAM C. CLARKE,
Assistant Editor
R. L. NIELSEN, Plant Manager
Lithium Corporation of America
Bessemer City, North Carolina

Problem: Control of time-temperature relationships in decrepitation of low-grade lithium ore is critical. If temperature is too low, decrepitation—conversion of alpha form of lithium oxide to beta form—will not take place. If too high, gangue materials begin to fuse with lithium oxide ore (spodumene), and promote ring formation in kiln. Extraction yield of lithium oxide will be reduced.

Lithium Corporation's Bessemer City plant uses a kiln 250 feet long. Temperature is maintained by burning natural gas. Burner extends eight to ten feet into kiln which rotates constantly at a speed of one rpm.

Spodumene ore contains relatively small amounts of lithium oxide in alpha form. Gangue materials include mica, feldspar, and other materials whose fusion points are close to temperature needed for decrepitation. Taking place at approximately 2000° F, decrepitation causes spodumene ore to become acid-soluble.

Once temperature is reached, conversion reaction is very rapid and occurs within a narrow temperature range. Actual specific temperature varies slightly, depending upon amount of gangue present.

LCA's problem was to measure continually internal temperatures of the rotating kiln . . . throughout its entire length . . . accurately.

Solution: Installing nine thermocouples over length of 250 foot kiln, engineers of the Bessemer City plant, devised a unique method for take-off of thermocouple readings. Copper rings, large enough to

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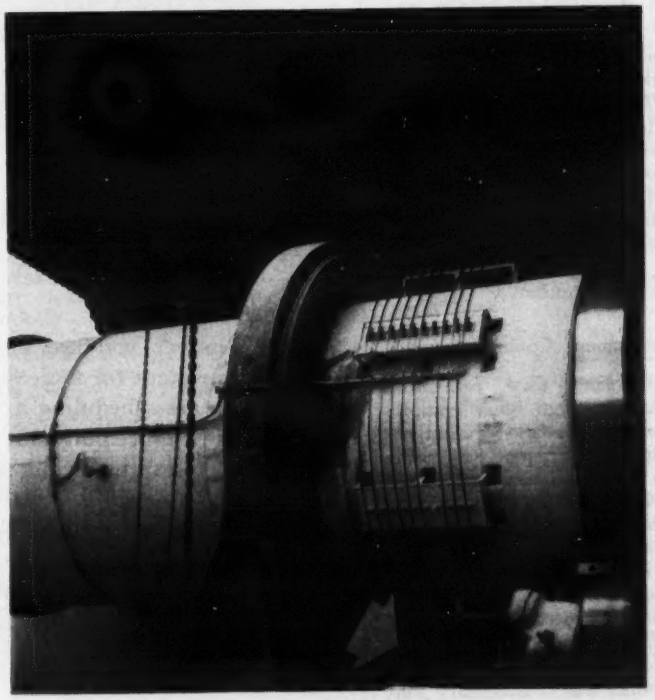

Copper rings encircling kiln serve as sliding contacts to maintain temperature control throughout entire kiln length of 250 feet. Weights (arrow) counter-balance carbon block assemblies to assure constant contact

No need for worry concerning "hot spots". Exact control of critical time-temperature relationships throughout entire length of 250-foot kiln is maintained by temperature and load measurements. Enclosed panel contains many of recording, indicating, and measuring instruments necessary to properly operate kiln

Reduces Kilns Hot Spots

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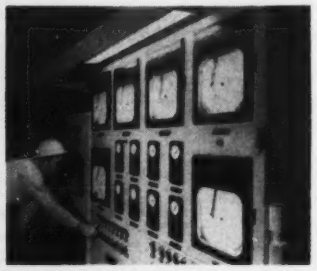
completely encircle the rotating kiln, are fastened to kiln's outer shell. Carbon blocks, serving as brushes, are mounted on steel framework and counter-balanced by weights. Temperature readings from all thermocouples mounted along length of rotating kiln are transmitted to a central control panel. All points are read and recorded at twenty-second intervals.

Since charge moves continuously through kiln, operator needs to know approximate amount in the rotating chamber. A wattmeter on 125 hp four-speed motor measures loads, also indicating to an



Operator "spot-checks" temperature point. Enclosed panel board (arrow) protects instruments against corrosive, humid atmospheres

experienced operator whether clinker rings are developing.

Flow rate of kiln gas, admitted into burner under pressure of 20 psi, is controlled automatically. Pyrometer controller and recorder is used with a 1¼ inch pneumatic valve on gas line. Kiln dampers are controlled by a six inch valve motor.

Instrument Control Panels

Engineering the remaining control system was complicated by corrosive, humid atmospheres, presence of abrasive dust, and constant, heavy vibration. Three factors suggested a pneumatic control system for the remaining plant needs. These were: positive air pressure of 15 to 20 psi would serve to protect system from effects of humidity, dust, and corrosive fumes. Secondly, at no point was it necessary that

GIANT TIDEWATER REFINERY HAS ALL THREE

PROTECTION

CONTROL

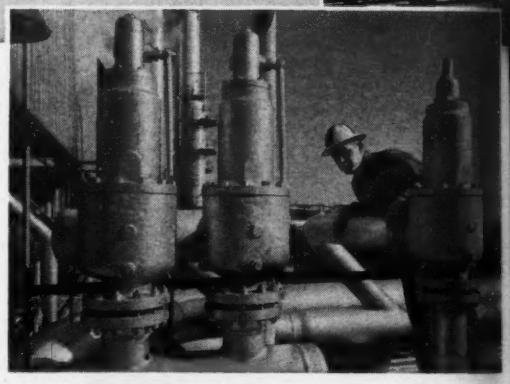
MEASUREMENT

with reliable products of Manning, Maxwell & Moore

The Tidewater Oil Company's mammoth new Delaware Refinery is rightly referred to as the "refinery of the future." C. F. Braun & Co., engineering contractors, built the plant on the 5,000 acre site. Most of the processing units are unequalled anywhere for size and capacity. Tidewater incorporated the most advanced design and equipment to assure the greatest flexibility, economy and safety.

To provide around-the-clock protection, control and measurement, this ultra-modern refinery makes full use of dependable Consolidated Safety Relief Valves, Hancock Valves and Ashcroft Pressure Gauges. These products of Manning, Maxwell & Moore are precision engineered and built to insure the perfect performance, freedom from costly maintenance and long-life service so vital to economical refinery operations.

Whether you are modernizing or enlarging your plant for increased capacity . . . whether you are scheduling a "turn-around," planning a new processing unit or adding storage facilities – call on Manning, Maxwell & Moore regarding problems in protection, control and measurement. District offices and industrial distributors in the United States and Canada as well as agents and manufacturing licensees throughout the world are ready to serve you.



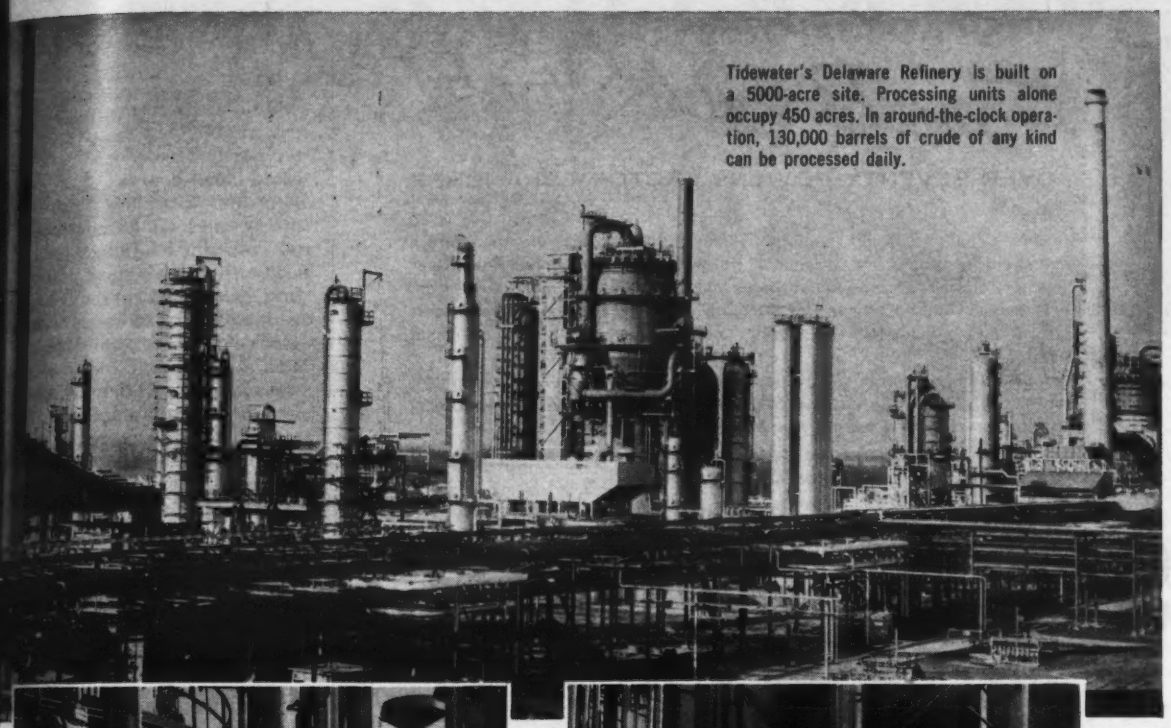
PROTECTION

. . . by **CONSOLIDATED SAFETY RELIEF VALVES.** The Orthoflow fluid catalytic cracker at Tidewater's Delaware Refinery is the world's largest. It is equipped with Consolidated Safety Relief Valves as are the propane storage bullets. These valves assure absolute protection through peak performance and consistently positive action, even where "superimposed" back pressure is in the relieving system.

Consolidated Safety Relief Valves are "2 in 1" valves with interchangeability so highly perfected that the Standard valve can be converted to the Balanced Bellows Seal type *in the field.* Standardized inlet and outlet face-to-face dimensions permit these valves to be interchanged with those of some other manufacturers.

Fewer functional parts and precision machining and alignment of parts assure long valve life and less maintenance.

MANNING,

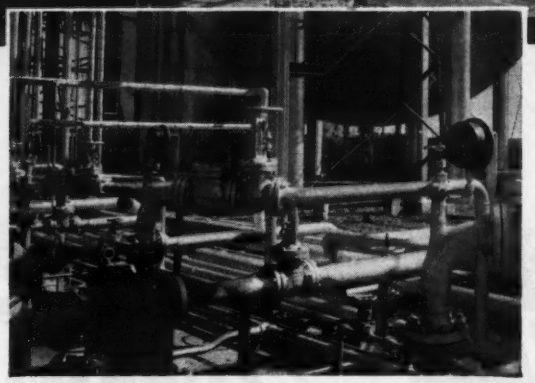


Tidewater's Delaware Refinery is built on a 5000-acre site. Processing units alone occupy 450 acres. In around-the-clock operation, 130,000 barrels of crude of any kind can be processed daily.

CONTROL

. . . by HANCOCK VALVES. The fluid-handling systems in Tidewater's Delaware Refinery must be kept at highest operating efficiency. To help control flow in the vast network of "fluid highways," hundreds of Hancock Valves are installed.

These manually-controlled valves are designed and built to give reliable performance under the pressures, temperatures and piping strains common to the most modern processing plant. All materials used in their construction are carefully selected — rugged strength and durability are engineered into every component. The super-hard seating surfaces are highly resistant to galling, steam cutting, wire drawing, erosion and corrosion. Positive tightness — leak-proof tightness — is assured month after month. Maintenance requirements are reduced to a minimum. Long-life service proves that there is no substitute for the economy of quality found in all Hancock Valves.



MEASUREMENT

. . . by ASHCROFT PRESSURE GAUGES. Accurate pressure measurement is essential to maintain product quality . . . to assure capacity performance of equipment and economical production in Tidewater's Delaware Refinery. Ashcroft Duragauges are precision instruments. They employ rotary geared motion — the most efficient and perfect method of transmitting mechanical motion. A choice of stainless steel movement or stainless steel with nylon bearings and pinion gear permits selection to meet specific requirements. Eight different Bourdon tube materials are available. Each Bourdon tube is "whip tested" at pulsating pressures approximately 50% higher than its pressure rating to insure calibration stability. Three case designs and materials and a complete range of dial sizes and pressures also provide for every individual need. Highest sustained accuracy and long service life are assured.

MAXWELL & MOORE, INC.

CONSOLIDATED ASHCROFT HANCOCK DIVISION

STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY VALVES, 'AMERICAN-MICROSEN' INDUSTRIAL ELECTRONIC INSTRUMENTS, *Stratford, Conn.*, 'HANCOCK' VALVES, *Watertown, Mass.*, 'CONSOLIDATED' SAFETY RELIEF VALVES, *Tulsa, Okla.*, AIRCRAFT CONTROL PRODUCTS, *Danbury, Conn. and Inglewood, Calif.* "SHAW-BOX" AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES, *Muskegon, Mich.* **In Canada:** Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario.

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

When inquiring check 5487 opposite last page

transmission lines be longer than 1100 feet. Most were only 200 to 300 feet. Thirdly, cost of a pneumatic system, excluding kiln controls, for seven million dollar plant was estimated at only $150,000 to $200,000.

After leaving heating kiln,

Lithium Corporation of America's Bessemer City plant. Decrepitation kiln feeds ore treatment facilities, rotating constantly at one rpm

decrepitated ore is cooled in a cooling kiln 200 feet in length. About 500 gallons of water flowing over kiln's outer surface brings ore temperature down to about 150° F. Air temperature leaving cooler is used as control point.

Moderately warm ore is then crushed by a ball mill, air-classified, and mixed with concentrated sulfuric acid, 500 pounds of acid to every ton of ore. Sulfuric acid tank level is measured by a bubbler-type level recorder.

Further processing requires reheating acid mix, slurrying it with water, and leaching. Limestone is added to neutralize lithium sulfate solution. After filtration and further concentration, soda ash is added to make lithium carbonate.

Most instruments used in plant have been grouped, wherever possible, on instrument panel boards. Facilitating and centralizing control activities, panel boards have also simplified piping of air and electrical lines, and saved space. Additional factor is protection furnished by panel board and enclosures against extremes of the corrosive, humid atmosphere. Moisture level in one department near leaching tanks, for example, sometimes reaches fog stage. Despite difficult operating

Turn to next page

IMMEDIATE DELIVERY

From Branch Stock!

OVER SEVENTY POWERS FACTORY BRANCHES

Powers is ready to deliver promptly . . . anywhere, anytime you need control equipment for process or "domestic" hot water or steam service lines. Over 70 factory branches in the United States and Canada assure fast delivery from local stock. In addition, these branches provide readily available field engineering counsel, application engineering, and service training for your plant personnel.

Powers Process Controls are available on an installed basis or as equipment only, allowing complete freedom of planning and installation. Call your local Powers branch for the full story or write to:

THE POWERS REGULATOR COMPANY
Dept. 957, Skokie 16, Illinois

POWERS

PROCESS CONTROL

When inquiring check 5488 opposite last page

conditions, instrument maintenance has not been excessive partly because of the protected panel boards.

Results: Complete temperature profiles of the constantly rotating kiln has meant practically the elimination of kiln "hot spots" before they have an opportunity to cause damage. Yet . . . relationships of time and temperature necessary for high throughput rates have been maintained.

Protection of recording and control instruments with enclosed instrument panels and enclosures has resulted in a steady precise job of recording, measuring, and indicating every step of the process . . . despite attacks of humid atmosphere, ever-present interference of vibration, and abrasive effects of dust.

(Instrument panels, thermocouples, and many instruments used at plant are product of The Bristol Company, Dept. CP, Waterbury, Conn. . . . or for more information check 5491 on form which is located opposite last page.)

Floatless transmitter

Data sheet of two pages describes system for transmitting water or waste flow measurements from a Parshall flume to flow recorder. Data Sheet 831-35—The Foxboro Co., Dept. CP, Foxboro, Mass. Check 5492.

Another Marsh development . . . new "SAFE-CASE" gauge for those conditions where over-pressures of explosive force can occur.

Face well protected by solid metal wall; but, still more important, *entire back* is thin metal plate that opens out to exhaust any abnormal pressure.
In testing, heavy blank cartridges, fired within back of case, did not even break crystal.
Use "Safecase" for your toughest services. It is standard in Marsh "Mastergauge"—the highest development in pressure gauges.
Ask for facts.

MARSH INSTRUMENT CO.,
Sales affiliate of Jas. P. Marsh Corp.
Dept. Z, Skokie, Ill.
HOUSTON BRANCH PLANT: 1122 Rothwell St. Sect. 15, Houston, Texas
Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta, Canada

Test Proves Safety
Explosive force of cartridge merely opens out safety-release back. Back is firmly attached to case and cannot be dislodged during a pressure blow-out.

MARSH GAUGES

When inquiring check 5489 opposite last page

Lumenite

AUTOMATIC CONTROLS

ELECTRONIC LIQUID LEVEL
INDUSTRIAL TIMERS
TIME SWITCHES
MAGNETIC SWITCHES

Ask for Bulletin

FL—Liquid Level
FM—Milk Level
FN—Nonconductive Liquid
ITC—Ice Thickness
BH—Boiler Level

Ask for Bulletin

LT—Time Switches
PC—Program Clocks
CR—Cycle Repeaters
R—Time Delay Relay
RMC—Automatic Reset

Lumenite Electronic Company
107 S. Dearborn Street Chicago 5, Ill.

When inquiring check 5490 opposite last page

FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

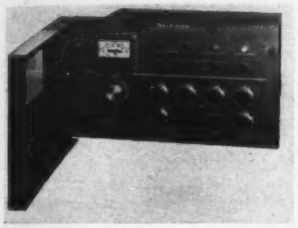
We'll contact the manufacturer for you. He'll send you the details direct.

Continuously analyzes up to four components of gas stream

Gas chromatograph will also control stream

Uses: Continuously analyzing and controlling as many as four components of a specific gas stream.

Features: Chromatograph is composed of two distinct instruments which can be placed as far as 1500 feet apart yet maintain accurate measuring and recording.



Industrial gas chromatograph has simplified control

Description: Chromatograph is actually two instruments, a control unit and an analyzer section. Analyzer is designed for Class 1, Group D locations. Instrument has $\pm .2°C$ temperature control up to 110°C and provides for split column operation. Chromatograph has simplified control, visual and permanent recorder readout, accuracy of $\pm 1\%$, a locking door, automatic or manual operation. Test circuit is integrated for periodic maintenance without disassembly.

(Gas chromatograph 120A is product of Beckman Instruments Inc. Process Instruments Division, Dept. CP, 2500 Fullerton Road, Fullerton, Calif. . . . or check 5493 on form opposite last page.)

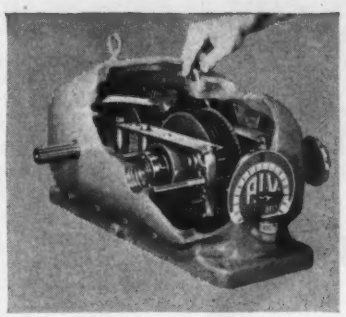
Describes meter selection

Revised 28-page illustrated bulletin is designed to help process engineers select best meter-register combination for any industrial liquid metering job. Bul 566 — Neptune Meter Company, Dept. CP, 19 W. 50th St., New York 20, N.Y. Check 5494.

How Link-Belt P.I.V. provides stepless speed control

By employing a positive chain drive to transmit power, Link-Belt's P.I.V. (Positive, Infinitely Variable) variable speed drive provides instant and positive speed settings, with no perceptive loss of speed regardless of load. Stepless variation of any speed from maximum to minimum can be obtained instantly, even while operating at full load.

The chain which forms the "heart" of P.I.V. is a self tooth-forming chain consisting of a series of overlapping steel laminations which serve as teeth and are free to move from side to side, singly or collectively (see below). This ingenious chain fits into radially grooved wheels (see below) which have teeth cut at a constant depth but of increasing width toward wheel periphery.



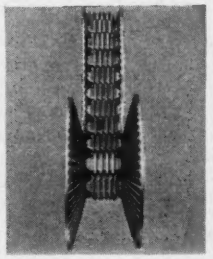
P.I.V.'s are compact, permitting installation as either a separate unit or as a built-in part of the driven machinery. Exceptional application flexibility can be accomplished by incorporating both motor and helical gear sets integrally with the P.I.V. drive.

By means of pneumatic, electronic, hydraulic or mechanical controls, P.I.V.'s can be used to synchronize machine components or complete machines with a precision matched by no other method. Whether these processes involve tension, volume, synchronization, winding speeds, moisture content, product thickness or similar requirements, these controls sense variations quickly and compensate for change through the P.I.V. before product quality is affected.

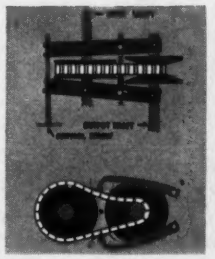
These unique P.I.V. drives are built in a wide range of sizes and assembly types, in capacities from ½ to 25 h.p.

Self tooth-forming chain consists of overlapping steel laminations serving as teeth.

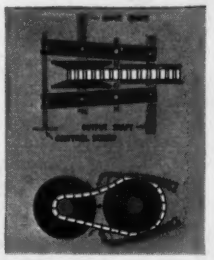
Teeth on radially grooved wheels provide grip for self tooth-forming chain.



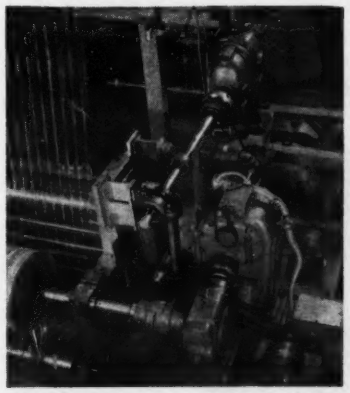
Chain teeth engage wheels to provide a positive chain drive to transmit power.



Maximum speed setting of the grooved wheels produces high speed at output shaft.

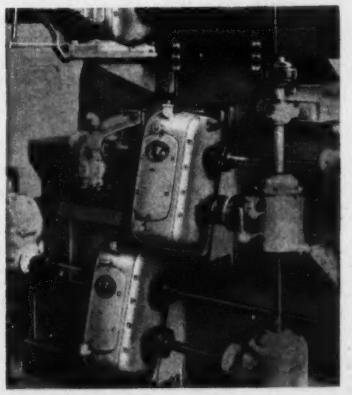


Minimum speed setting of the grooved wheels produces low speed at P.I.V. output shaft.



PRINTING—P.I.V.'s on windup and dryer rolls prevent tension build-up on press running cellophane sheet.

PAPER MAKING—P.I.V. with remote control lets operator control draw on differential drive paper machine.



TEXTILES—P.I.V.'s on rayon spinning machine control thread denier and speed of viscose metering pumps.

BOOKS 2274 and 2349 describe P.I.V. drives and controls, respectively. Get your copies from your nearby Link-Belt office or authorized stock-carrying distributor.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,916

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So SIMPLE that "Specials" are Likely to be Standard!

A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol

MAGNETROL

The World's Most Dependable

LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . . with multi-stage switching when desired. Send coupon for full details.

MAGNETROL, Inc.

Send Coupon For Full Details

MAGNETROL, Inc., 2129 S. Marshall Blvd., Chicago 23, Illinois 6

Please send me catalog data and full information on Magnetrol Liquid Level Controls.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

When inquiring check 5496 opposite last page

INSTRUMENTATION

Control of fuel to kiln is critical: too much could burn it up

Rotameters found as answer to maintaining 3250°F temp

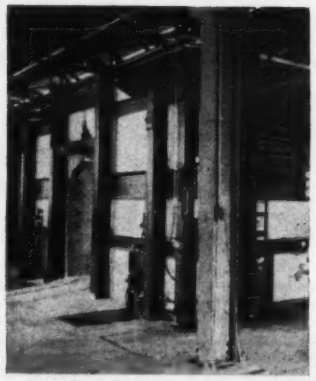
Problem: Accurate control of fuel oil is essential in heating a kiln for a high quality refractory. Otherwise extreme damage can be caused — as burning out the furnace wall.

A 120-ton kiln of radically new design was developed by Richard C. Remmy Son Co., Philadelphia, Pa., to make Crystallite grog, a high grade synthetic mullite (an aluminum silicate used in high quality refractories).

To produce a grog of very high purity, kiln is designed to operate at 3250°F, probably highest temperature in any commercial kiln in the US.

Due to constant high temperature required, accurate fuel control is necessary. Heat-generating potential of burners is so great that improper regulation of fuel could cause damage.

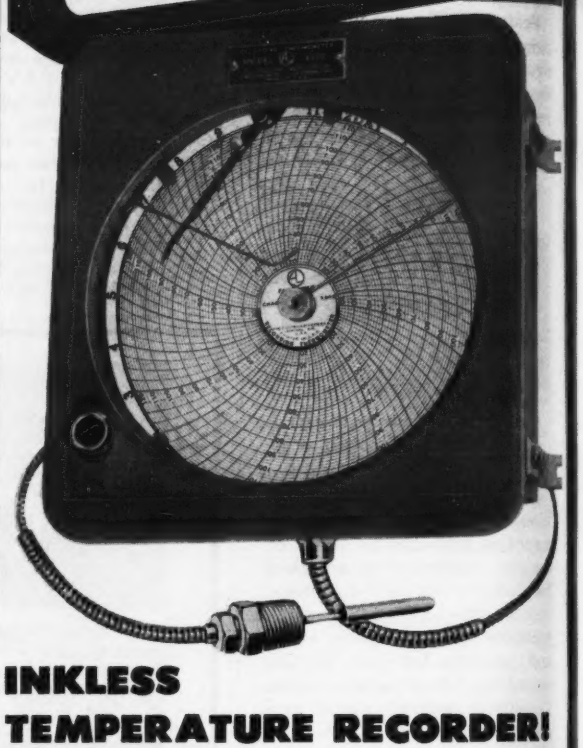
Solution: Kiln employs four special oil burners which function on regenerative principle similar to an open hearth. Arrangement is highly efficient, but requires very accurate control of fuel and air. Initial attempts made to control fuel by means of micro-metering valves and numerous gas analyses was very time-consuming and required extremely close supervision.



The 120-ton kiln is used to make synthetic mullite, requires accurate control of fuel flow to its four regenerative-type oil burners

NEW

AUTO-LITE



INKLESS TEMPERATURE RECORDER!

The newest advance in temperature recording . . . Auto-Lite model 2200 operates completely without ink. It simplifies temperature recording for most processing operations.

- 2 small mercury batteries in case energize transistor oscillator connected to stylus arm.
- Stylus records temperature on 6" evenly calibrated sensitized chart.
- Battery life approximates 2000 hours.
- Records operating temperatures for 24-hour or 7-day cycles.
- Easily serviced—minimum maintenance.

Electric or mechanical chart drive available for either 24-hr. or 7-day rotation. In wall mounting, portable and self-contained type cases. Remote reading with capillary tubing. Temperature charts in ranges from —40°F to +550°F. Write for further information.

THE ELECTRIC AUTO-LITE COMPANY
INDUSTRIAL THERMOMETER DIVISION
TOLEDO 1, OHIO
NEW YORK • CHICAGO • SARNIA, ONTARIO

When inquiring check 5497 opposite last page

After only two firings, rotameters were installed on fuel line. Rotameters have high measuring accuracy and have a detachable metal scale which permits direct reading of fluid being measured.

Results: Great visibility and accurate rate of flow measurement of rotameters permit kiln operator to easily — and quickly — check rate of fuel flow. A small fuel saving has also been realized.

(Series 18210 Safeguard Rotameters are products of Schutte and Koerting Co., Dept. CP, Cornwells Hgts., Bucks City, Pa. . . . or for more information check 5498 on form opposite last page.)

Reads percent water of granular material and is portable

Has accuracy of ±5% on materials where calibrated

Uses: As rapid direct-reading meter for measuring moisture-percentage of granular materials.

Features: Moisture meter is portable and has accuracy of ±5% on material for which it has been calibrated.

Description: Unit operates on DC conductance-impedance principle using AC signal of 1000 cps. Instrument has

Turn to page 62

Moisture meter reads percent moisture directly

life insurance

Even a good product reputation can be quickly tarnished by a single in-service failure or mal-function. That's why we at K&M have invested so heavily in rigorous quality control: it is our product life insurance. For example, we use a total of eight hundred and fifty-four dimensional tests in checking out precision-machined valve parts. We periodically probe vital valve innards with searching gamma rays (from radioactive Iridium 192) to detect subtle flaws . . . the kind that could become major troubles when subjected to in-line strains and stresses. K&M is the only control valve manufacturer using radiographic inspection techniques of this type within its own plant. Such exacting quality control is very important insurance for us—and very valuable assurance for you. It is, in effect, a guaranty of precision valve performance over a long service life.

K&M
diaphragm control valves
KIELEY & MUELLER, INCORPORATED
Our 78th Year
Oldest Pressure and Level Control Valve Manufacturer
64 Genung Street, Middletown, New York

When inquiring check 5499 opposite last page

Derivative unit mounts easily on underside of base plate.
All adjustments are readily accessible, visible and easy to make.
Special "Balanced Beam" design permits mounting in any position without zero shift.
MASONEILAN TEMPERATURE TRANSMITTER
Distinguished by Exclusive Features
MASONEILAN
Impo
force
accur
• Bala
withou
• Unit
of ran
compe
assemb
disasse
• All c
other
by vib
• Prot
beam
by bui
• Indi
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A Pres
mitter
mitter
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conditi
Write

Important design differences in this newly developed force-balance transmitter offer advantages in accuracy and dependability. For example:

- **Balanced Beam** design permits mounting in any position without zero shift.
- **Unit subassembly** construction permits removal (for change of range, replacement or maintenance) of thermal system; compensating bellows; feedback bellows; pilot; range span adjustment assembly; derivative unit; gasketless nozzle — any or all without disassembling beam assembly in any way.
- **All adjustments visible and accessible** without disturbing any other part of the mechanism. Range span setting is unaffected by vibration.
- **Protection against damage** is provided for thermal system by a beam stop and the overrange feature; for compensating bellows by built-in stops; for entire unit by rugged weatherproof case.
- **Indicating Receiver Gauge** may be installed directly in manifolded base plate — no piping or tubing required.

A Pressure Transmitter, Too: The temperature transmitter may be readily converted to a pressure transmitter by substitution of a pressure element for the thermal system (within limits imposed by pressure conditions and characteristics of measured fluid).

Write for bulletin or secure details from our nearest office.

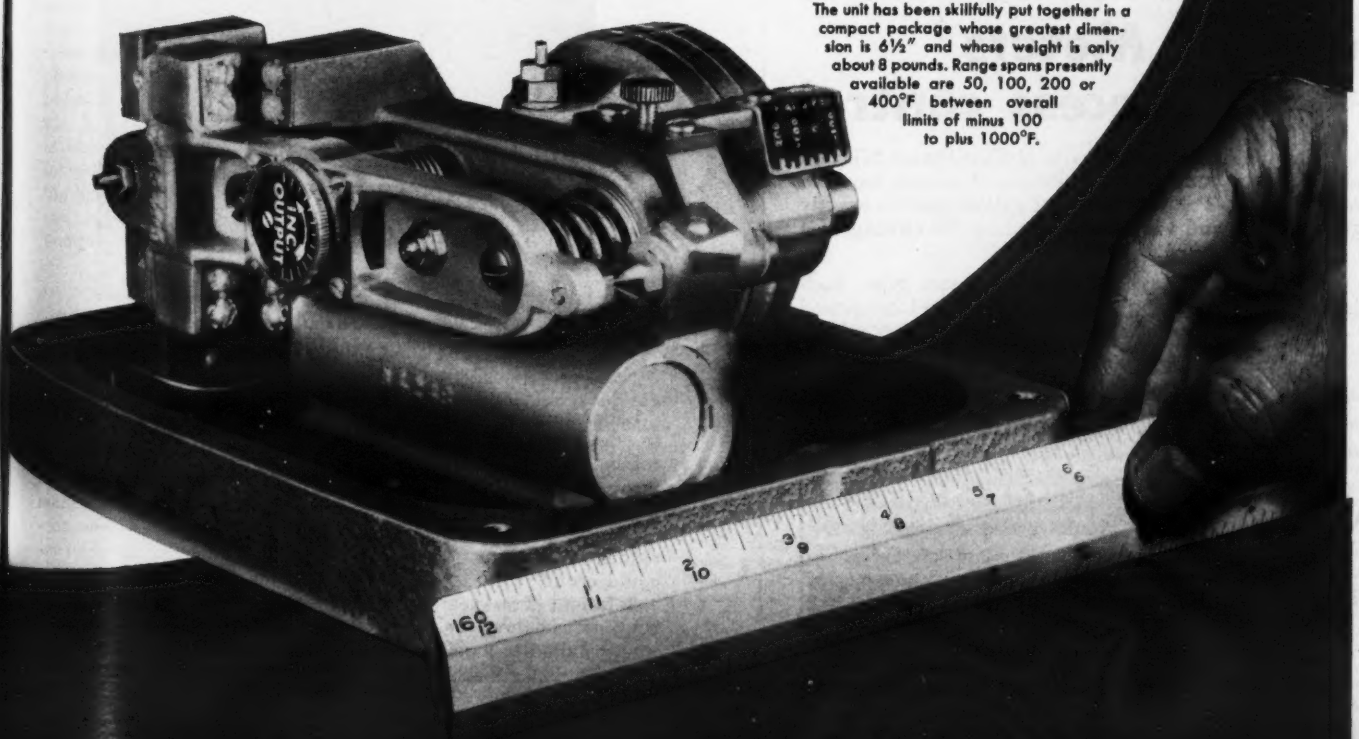
MASONEILAN

MASON-NEILAN

Division of Worthington Corporation

25 NAHATAN STREET, NORWOOD, MASSACHUSETTS

SEVENTY-FIFTH 75 ANNIVERSARY



The unit has been skillfully put together in a compact package whose greatest dimension is 6½" and whose weight is only about 8 pounds. Range spans presently available are 50, 100, 200 or 400°F between overall limits of minus 100 to plus 1000°F.

For more information on product at left, specify 5500 see information request blank opposite last page.

You get EXACTLY
what you set —
No More — No Less!

When you use NIAGARA
Displacement Meters for process control

Consistent accuracy in liquid measurements is obtained with Niagara Electricontact Meters. Set the gauge for the number of gallons required and accuracy goes into action. The set number of gallons will be exactly measured through the meter and the flow stopped by the closing of a solenoid valve.

Niagara Meters are of the accurate, positive displacement type. Each Niagara Meter is guaranteed to be individually tested and calibrated at the factory to run within close tolerances at all rates of flow within its rated capacity.

Learn all the facts . . . Mail the coupon for complete information.

BUFFALO METER CO.
2892 Main Street
BUFFALO 14, N. Y.

Please send me complete information on the use of Niagara Electricontact Meters for liquid formulations.

Liquid used.....
Flow G.P.M.....°F.....
Name.....
Company.....
Address.....

When inquiring check 5501 opposite last page

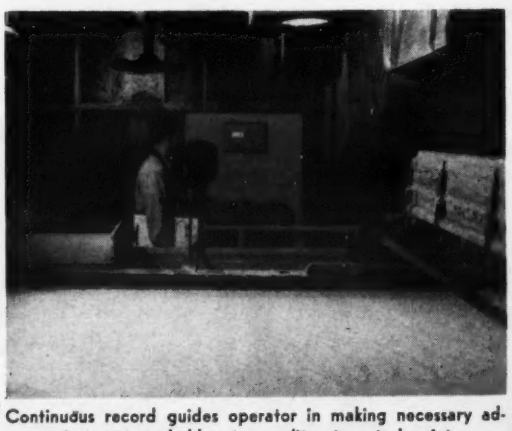
'We wanted a quick method to determine amount of solids in water going into paper machine. Lab tests are too slow. We tried an industrial flow colorimeter.'

stream analyzer continuously monitors water quality

R. E. BOEDEKER, Plant Manager
Container Corporation of America
California Container Corporation Division
Los Angeles, Calif.

Problem: California Container Corporation Division of Container Corporation of America, Los Angeles, needed a quicker method to determine quality of reclaimed water entering paperboard machine. High concentration of solids in the water clogged needle-point showers used on the machine's felts.

"White water" from paper machine, containing four to eight pounds of solids per 1000 gallons, is treated in clarification unit. Solids are removed by flotation. Clarified water, with 0.1 lb solids per 1000 gallons, is pumped to storage chest. Some of the clarified water is used in the felt showers. Remainder passes through a plate-and-frame filter before re-use on cylinder showers, which require cleaner water.



Continudus record guides operator in making necessary adjustments to hold water quality at control point

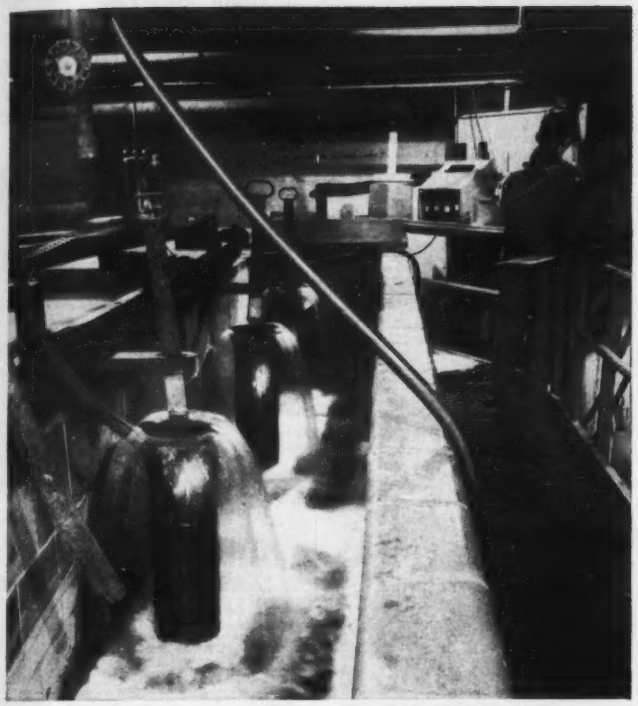
Laboratory tests were used to determine percentage of solids in water after passing through clarification unit. During time lag, before results could be given to operators, extensive process damage could occur.

Solution: Two years ago, a continuous flow colorimeter was installed to monitor water entering paper machine.

Slip stream is taken from discharge side of clarification unit for continuous monitoring. Discharge from colorimeter is returned to clarification unit.

How flow colorimeter works

Sensing unit of instrument



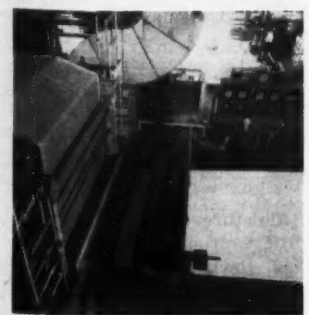
Container Corporation of America uses industrial flow colorimeter to make sure water from clarification unit is "clean"

is composed of light source compartment, flow chamber, and receiver compartment. In operation, instrument uses same physical relationships to measure turbidity (or color intensity) as apply to spectrophotometry. Filtered light passes through the water sample. A certain amount of light is absorbed, depending upon intensity of turbidity. Remaining light passes through water and is detected by sensitive phototube in receiver. After amplification, signal is read on standard potentiometric recorder.

Essentially a stream analyzer, instrument gives a continuous record of water quality. However, important point is the colorimeter is not an absolute guide for determining turbidity. Final control is a laboratory analyses every two hours using quantitative filtration methods. Colorimeter is used as a relative guide to hold the control point. Any variation immediately indicates an upset in water quality. Immediate adjustments can be made to correct situation.

Depending on grades of paper run, each control point is different. Although straight line correlation between colorimeter's readings and tur-

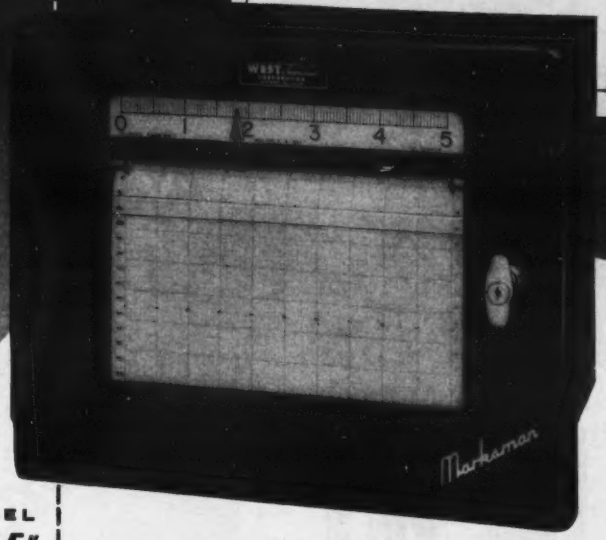
Turn to next page



Flow colorimeter tells operator quality of water fed to paper machine

For more information on product on right, specify 5502 . . . see information request blank opposite last page.

NEW by WEST



MODEL "M" SERIES

Marksman tubeless electronic potentiometer strip chart RECORDER for recording and controlling such variables as temperature, speed, strain, pH and many others.

- No vacuum tubes. Sensitivity of 5 micro-volts or less.
- Potentiometer for thermocouple (TCB protected) or radiation pickup, Wheatstone bridge for resistance pickup.
- Full selection of standard scale ranges . . . 11" calibrated chart width.
- Selector knob changes chart speed . . . 5 speeds per unit without gear change.
- Single or multi-record units available.
- Equipped for 115 or 230 volts — no transformers needed.
- Additional features: Automatic standardization . . . cold junction compensation for thermocouple use . . . battery condition indicator for potentiometer . . . built-in chart saver . . . designed for standard 19" relay rack.

CHEMICAL SHOW BOOTH 1353

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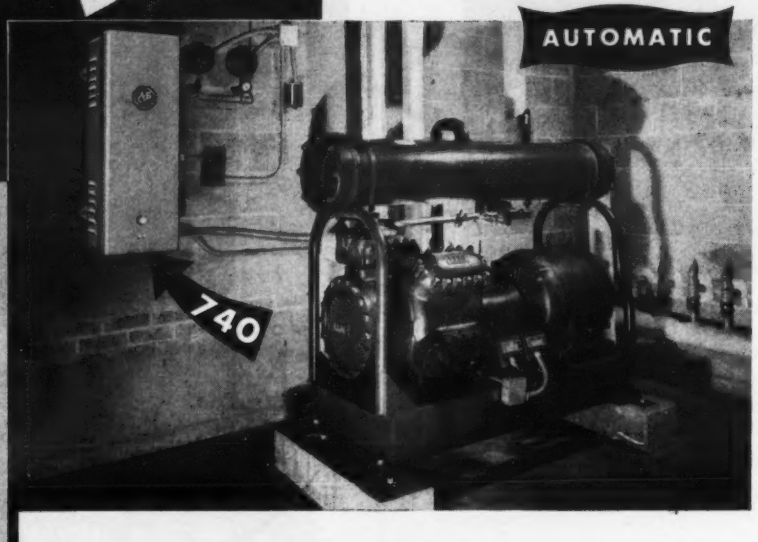
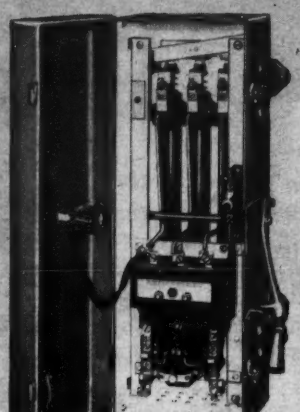
NOW you can have all these practical advantages in a single instrument. Write for Bulletin M.

the trend is to WEST

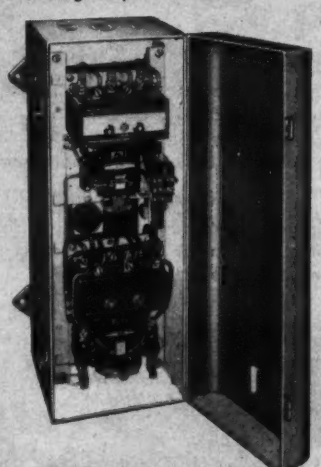
Large CP compressor equipped with Allen-Bradley Bulletin 640 resistance starter. Motor is speeded up by slowly raising starter lever. No current inrush—velvet smooth start.

Trane air-conditioning compressor equipped with Allen-Bradley Bulletin 740 automatic resistance starter. Two-step starter smooths out current inrush—prevents lamp flicker.





BULLETIN 640 manual starter with cabinet open to show the three starting compression resistors.



BULLETIN 740 automatic resistance starter. Starting resistors are located behind the two contactors.

EASY ON THE LINE... EASY ON THE MOTOR

No jerks or jolts—Satisfies the power company

Allen-Bradley compression resistance starters afford a neat solution for smoothing out the starting current and torque of heavily loaded squirrel cage motors. Graphite disc resistors, available only in Allen-Bradley compression starters, control the starting current and torque with velvet smoothness . . . and without lamp flicker.

These jerkless starters prevent damage or undue stress on belts, chain drives, or gears. They are equipped with dependable and accurate overload relays.

Available for squirrel cage motors up to 200 hp, 220-440-550 v. Send for Bulletins 640 and 740, today.

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AB

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

When inquiring check 5503 opposite last page

Stream Analyzer

Starts on page 60

bidity has been obtained for each grade, variations in grade and particle size allow only an approximate turbidity reading.

Instrument is flushed and calibrated every day. Only a few minutes are required.

Results: Use of the flow colorimeter has given Container Corporation a true stream analyzer for continuously monitoring water to paper machine. Of utmost importance is that:

- fluctuations in readings indicate process upsets. Water - treatment corrections can be made and results determined immediately;
- operators have been able to develop better filtering, with a longer filter cycle between cleanings.

Eventually, the instrument will be used as a control unit. Automatic valves will operate from colorimeter's sensing device to transfer "dirty" water back to dirty-water chest rather than into the clean-water chest. An automatic fresh water make-up will prevent the clean water chest from going empty during upset periods.

(Industrial flow colorimeter is manufactured by Scientific Instruments Div., Beckman Instruments, Inc., Dept. CP, Fullerton, Calif. . . . or for more information check 5504 on form opposite last page.)

Moisture Meter

Starts on page 57

been calibrated for gypsum, kalsomine, plastic powder, talcum powder, some powdered chemicals, malt mash and other materials. Instrument is transistorized to reduce weight and for long life. Indicating meter is 0 to 100 micrometer. Entire unit weighs less than 1½ pounds.

(Moisture-o-Meter, Model 910, is product of Henry Francis Parks Laboratory, Dept. CP, 920 Stambaugh Street, Redwood City, California . . . or for more information check 5505 opposite last page.)

Saturated hydrocarbons concentration in air . . .

. . . can be determined by simple, field apparatus developed for the Air Force. Originally designed for anal-

ysis of jet fuel vapors, device can be operated by untrained person to determine concentration of aliphatic or alicyclic hydrocarbons in 0 to 5000 ppm range with accuracy of ± 20%. Time required for determination is only 5 minutes.

(Apparatus for determining concentration of hydrocarbon in air was developed by Stanford Research Institute, Dept. CP, Menlo Park, Calif . . . or for more information check 5506 opposite last page.)

Danger shut-off for heater

Precision pneumatic relay solves refinery problem

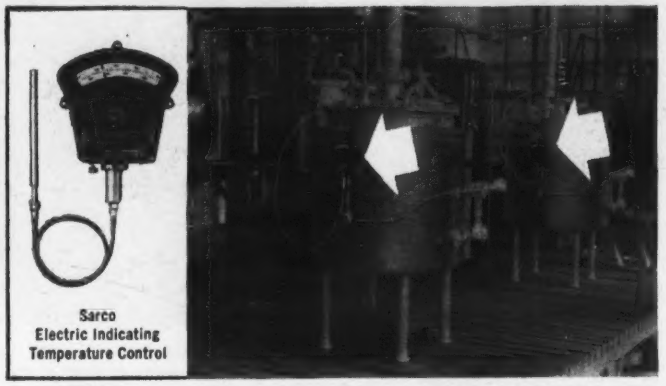
Problem: "Coking-up" of piping in charge heater of large Texas refinery was occurring when charge temperatures rose to excessive values.

Coking would cause a high-pressure drop across tubes with increased pumping pressures. Hot spots were likely to develop with resulting line failure. Increased maintenance was necessary to clean tubes or replace them.

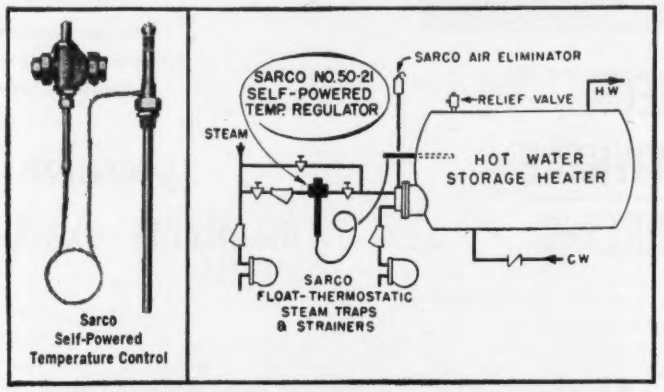
Charge temperature is measured and controlled at heater exit. Detection of low flows and higher-than-safe temper-

Turn to page 67

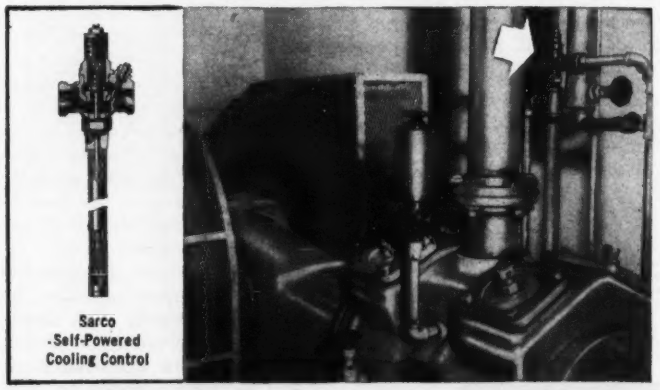
End uncertain temperature control this simple low-cost way



STILLS — jacket water temperature of stills held to within ± ½°F. *Other typical applications* — kettles, sterilizers, chemical tanks, plating tanks, processing vats, etc.



HOT WATER STORAGE HEATER — desired water temperature is automatically maintained. *Other typical applications* — dryers, oil storage tanks, kilns, heat exchangers, etc.



COMPRESSORS — controls temperature of cooling water, prevents overcooling and undercooling in compressors, aftercoolers and intercoolers. *Other typical applications* — small engines, condensers, ball mills, water-cooled bearings, lubricating oil coolers, etc.

SARCO Automatic Temperature Controls

Electric Indicating and Self-Powered

Simple—Dependable Inexpensive

YOU CAN get rid of costly, hit-or-miss manual temperature control . . . without investing in expensive equipment.

These Sarco Automatic Controls are simple, inexpensive, dependable. They're ideal for hundreds of temperature regulating jobs . . . all but the few specials that call for costly, elaborate controls.

Electric Indicating Controls by Sarco are simple, sensitive . . . perform many of the functions of much more elaborate recorder-controllers, at fraction of their cost. Responsive to temperature changes of ± ½°F. Cost . . . only about $100.

Sarco Self-Powered Controls need no outside power source. Self-contained. Packless. ½" size temperature controller . . . only about $100. ¾" size cooling control . . . only about $39.

Users of Sarco Controls include Colgate-Palmolive, Sinclair Refining, Swift, Ingersoll-Rand and hundreds of others.

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NOW YOU CAN CHECK RELATIVE HUMIDITY ANYWHERE— NO SLINGING OR WHIRLING

This brand-new Bendix-Friez Psychron gives you extremely accurate relative humidity and dew point information with just the flick of a switch. It is a battery-powered portable psychrometer designed and manufactured to meet rigid U. S. Weather Bureau specifications.

Unlike ordinary sling psychrometers, the Bendix* Psychron requires no whirling or special technique to operate. Three standard-size flashlight batteries power a tiny fan that draws air over wet and dry bulb thermometers at a rate exceeding 15 F.P.S. As a result, the Psychron can be safely used in close quarters. It has a special thermal shield to avoid radiation effects for use in bright sunshine and built-in illumination for use in dark or poorly lighted areas.

Order direct from us or through our nearest dealer. For further information write: Bendix-Friez, 1450 Taylor Ave., Baltimore 4, Maryland.

*REG. U.S. PAT. PEND.

$68.50

Price includes metal carrying case, nylon neck strap, psychrometric slide rule, 1-oz. plastic water bottle and instruction book containing humidity and dew point tables.

Friez Instrument DIVISION

Bendix AVIATION CORPORATION

When inquiring check 5508 opposite last page

Instrument panel for reactor centralizes control. Valves below panel permit operator to open or close flow lines to reactor and storage tanks — without leaving panel

Continuous production of an agricultural fungicide at Calhio requires all reactions be completed, with no excesses . . .

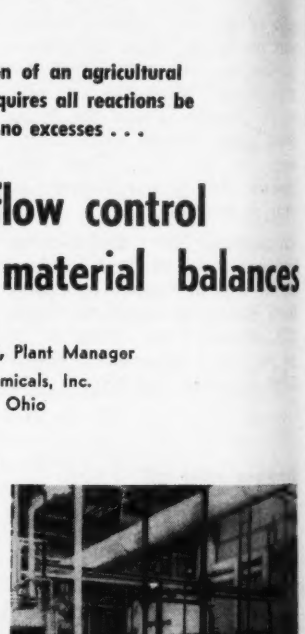
precision flow control maintains exact material balances

H. M. GODSON, Plant Manager
Calhio Chemicals, Inc.
Perry, Ohio

Problem: Failure to control exactly, the feed rates of two reactants in manufacture of Captan, a fungicide, at Calhio's Perry, Ohio, plant, would impair product quality and reduce its effectiveness as an agricultural aid. The two materials react in exact quantities. Excesses of either chemical in the fungicide would reduce its reactivity.

Not only must the reaction for the finished product be controlled exactly, but distillation of solvents to obtain one of the raw materials must also be closely controlled. Still bottoms must be removed at a pre-calculated rate, proportional to feed rate. Operation must be in parallel, with *no* deviations.

Solution: Technique of using controlled volume pumping

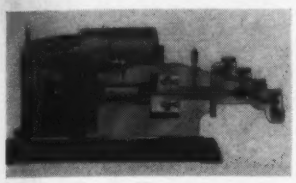


Exact material balance is maintained on distillation unit by three controlled-volume pumps, similar to these two. Precise feed control is developed. Pumping capacity can be changed by screw adjustment of plunger stroke length

has been developed and refined by personnel of the Calhio plant to achieve the highly-accurate flow control necessary.

Controlled-volume pumps are used at five strategic points: feeding of solvents to the still, take-off of bottoms (perchloromethylmercaptan or PPM), take-off of distillate, feeding of PPM and second reactant (a classified material known as P-10) to form the final product.

Parallel operation of the still



Cutaway of controlled-volume pump

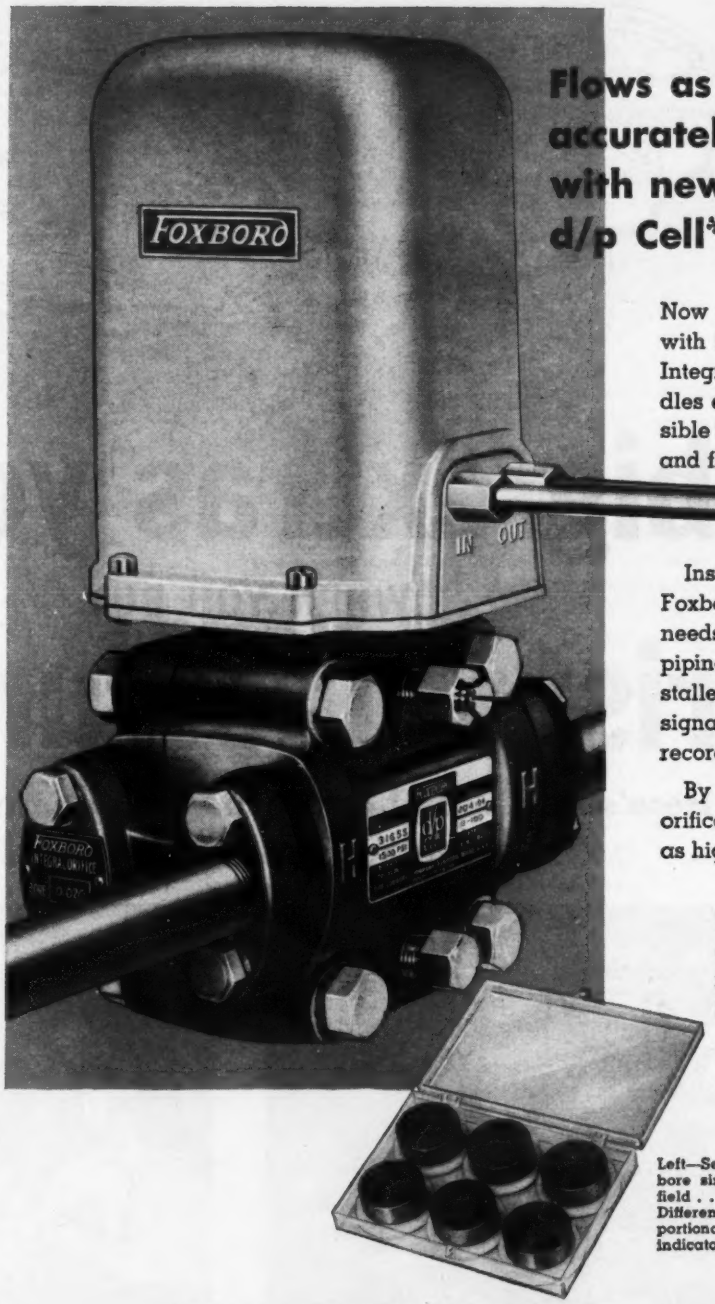
feed and distillate removal pumps requires that capacity settings be retained throughout each shift. Capacity changes on the three pumps for the still are made by screw adjustments *only*, while the pumps are stopped.

To obtain the greatest possible pumping accuracy of the two pumps feeding the reactor system, constant level tanks are used to eliminate suction pressure changes. These tanks are equipped with float-controlled valves which automatically maintain constant levels. As an additional check on quantities flowing to the reactor, operators determine pump capacities with a stop-watch four times a shift. Manual dial adjustments of the plunger stroke can be made on these two pumps during operation.

All pumps are installed with duplicate standby units. Manifolds permit either pump to be serviced while the other pump is being used. Complete control of flow to reactor is centered at an instrument panel close to the unit. Valves below the panel permit the operator to open or close flow lines to reactor and storage tanks — without leaving the panel.

Turn to next page

FOXBORO BREAKS "RANGE BARRIER" IN SMALL-FLOW TRANSMISSION



Flows as small as .003 gpm accurately measured, with new Integral Orifice d/p Cell* Transmitter

Now you can measure and transmit small flows with full accuracy and dependability! The new Integral Orifice d/p Cell Transmitter easily handles exceedingly low flow rates formerly impossible in pilot plant operations, research problems, and fluid ratioing.

Installed directly in the process line, the Foxboro Integral Orifice d/p Cell Transmitter needs no meter primary device or connection-piping . . . and no straight runs. It can be installed in any position. A direct 3-15 psi output signal is delivered to any standard indicator or recorder.

By suitable range selection through change of orifice inserts, flow rates as low as 0.003 gpm or as high as 5.0 gpm can be accurately measured.

The Foxboro Type 13A Integral Orifice Transmitter gives you, not only new high accuracy in measurement, but also accurate remote indicating and recording. Write for complete details. **The Foxboro Company, 819 Neponset Ave., Foxboro, Mass., U.S.A.**

*Reg. U.S. Pat. Off.

Left—Set of six interchangeable orifices is available in standard bore sizes from 0.020" to 0.250". They're easily changed in the field . . . merely inserted within the transmitter connection block. Differential pressure across orifice is converted to directly proportional 3-15 psi air output signal and transmitted to remote indicator or recorder.

FOXBORO
REG. U.S. PAT. OFF.
INTEGRAL ORIFICE d/p cell transmitter

When inquiring check 5509 opposite last page

Flow Control

Starts on page 64

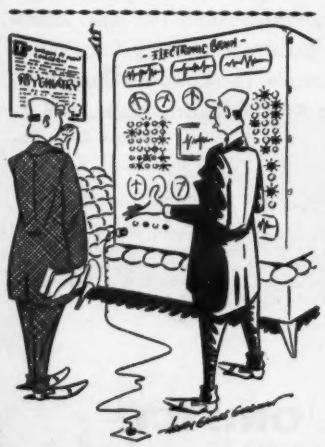
To prevent iron contamination of Captan and the intermediate chemicals, three pumps connected to the still and the reactor feed pump for PPM are specially constructed. These pumps have Monel liquid ends, Hastelloy B ball checks, and ceramic plungers.

Results: Obtaining high control accuracy at low flow rates in production of Captan, Calhio Chemicals, Inc., has maintained production of high-quality product . . . continuously. Exact material balances within the process have been attained . . . and maintained over long sustained periods.

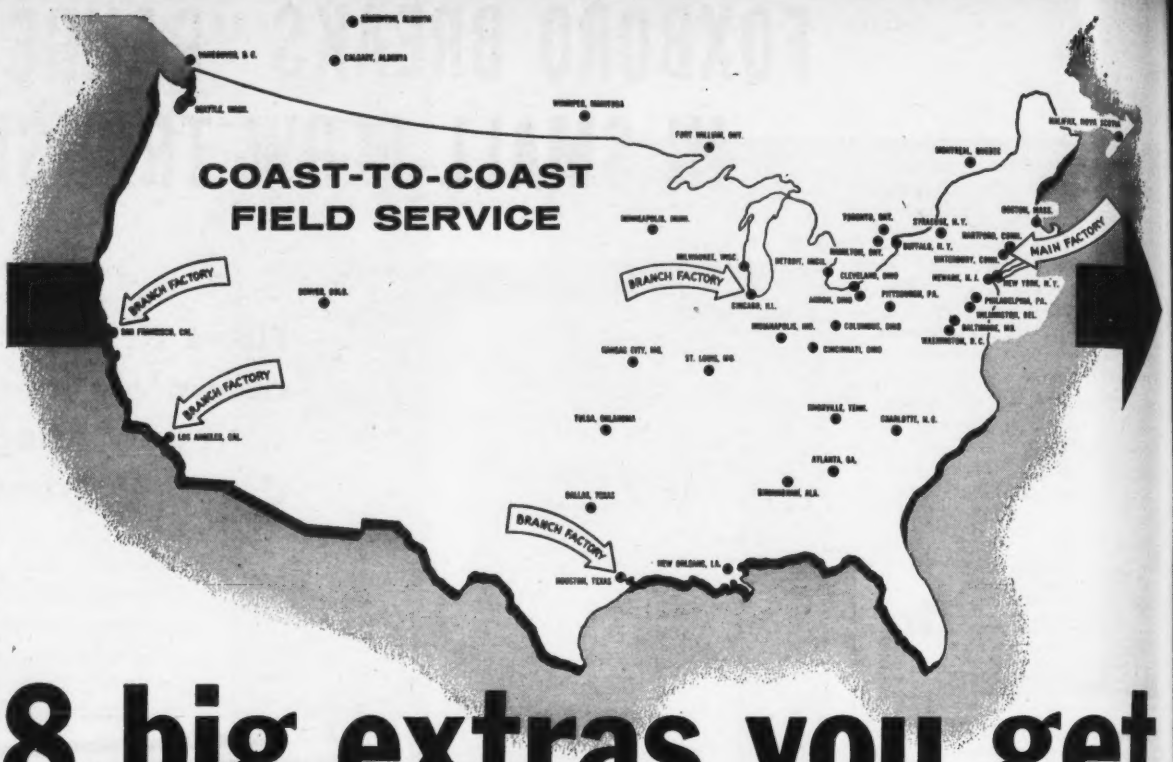
(Controlled-volume pumps are a product of Milton Roy Company, Dept. CP, 1300 E. Mermaid Lane, Philadelphia 18, Pa. . . . or for more information check 5510 on form opposite last page.)

Planning control center?

Manufacturer's control centers are described in 16-page manual. Special attention is given to planning control center and writing the specifications. Bul SM 244 — Square D Company, Dept. CP, 4041 N. Richards St., Milwaukee 12, Wis. Check 5511.



"Paranoid? Heavens, No! It's showing all the symptoms of Schizophrenia!"



8 big extras you get

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- Pyrometers
- Recorder charts
- Resistance thermometers
- Smoke density recorders
- Specific gravity instruments
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- Telemetering instruments
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- Time-program controllers
- Valves, automatic

*T.M. Reg. U. S. Pat. Off.

Ask for information on the subject of interest to you. We'll be glad to send it.

BRISTOL

TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

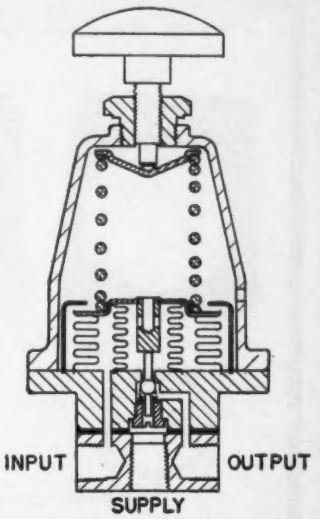
When inquiring check 5512 opposite last page

Pneumatic Relay

Starts on page 63

ature is thus delayed. By this time coking will have occurred.

Solution: Using a precision pneumatic relay and a three-way manual reset valve, refinery engineers detect low



Adjustable direct-acting precision relay. Pressure change of 1% in supply air causes relay to act

charge flows and shut off fuel gas before coking occurs. Continuous signal is developed by flow transmitter and fed to relay. Output of relay acts to hold open three-way valve, controlling gas feed to burner. If flow rate diminishes below preset quantity, relay causes valve to close gas line. Thus heater is shut off.

Relay is adjustable over instrument air range of 3-15 psig, representing 0-100% of input variable. Relay operates through narrow proportional band of approximately 1%. Essentially, effect is snap-action at set point.

Results: System has been used for at least a year. Maintenance on heater tubes has been reduced. Tube damage no longer occurs.

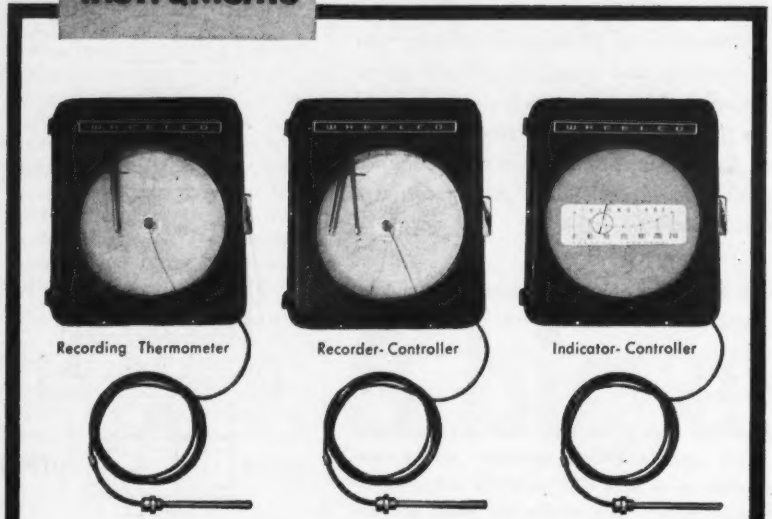
(Precision pneumatic relay is product of Moore Products Co., Dept. CP, H & Lycoming Streets, Philadelphia 44, Pa. Check 5513 on form opposite last page.)

THE MARK OF QUALITY

BARBER COLMAN

Wheelco Instruments

New! 4000 Series Thermotrols for Indicating, Recording, and Controlling



New 4000 Series Thermotrols for indicating, controlling, or recording service have standard operating ranges of –40 to 1000° F. All are mercury-actuated with recorders being available as single-, two-, and three-pen units. A wide variety of control forms is possible because of plug-in chassis design.

Other outstanding features of the new Thermotrols line include: Invar metallic compensator for case, friction-free pen arms, electronic control action for controllers with the Wheelco "Electronic Link," and electric clock chart drives.

Bulletin F-8042 has more data on these new Thermotrols. It's available from your nearby Wheelco field engineer.

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When inquiring check 5514 opposite last page

JOSEPH H. LANCOR, JR.
vice-president in charge of engineering,
Consolidated Electrodynamics Corporation

Automatic data equipment — today in the chemical industries

JOSEPH H. LANCOR, JR.
Vice-President, Engineering
Consolidated Electrodynamics Corp.
Pasadena, California

Most clearly defined trend today in automatic data-processing techniques is in integration of measurements. "Logging" systems for centralized tabulation of temperatures, pressures, flows of entire refineries are under construction. Many of the installations already operating are acting as "guinea pigs," providing needed information for design of better equipment.

Results are already apparent. The gap between theoretical concepts of feedback systems and practically automatic operation of chemical processes is being bridged.

However, the need for improved measurement of pressure, temperature, other variables is being emphasized. To establish controls, measurements must be reliable, direct, complete, and dynamic. Many of the more sophisticated instruments lack reliability, ruggedness, and ease of servicing. For production acceptance, equipment also must be explosion-proof, hardy, and be able to operate despite severe vibrations from turbulent flows.

To directly measure specific properties controlled, new sensing elements are needed. Methods for direct measurement of the primary process

variable are required. Today's use of improved viscometers, refractometers, and mass spectrometers is an example.

Completely variable measurement systems are needed to develop basic understanding of the processes involved. In some processes, reaction rates are functions of pressure, temperature, composition, catalyst activity, and degree of agitation. Inter-dependence of these variables often is known only in a general sense. Many processes cannot be controlled today because the process itself is either unstable or at best is non-linear.

Dynamic analysis of reactions and control systems is needed. Present-day manual control methods are good only for steady-state operating conditions. Delays in manual controls mask completely the transient or dynamic effects.

Direct and continuous measurement of end-products will open the door to dynamic analysis. Measurements will be made in seconds or minutes rather than hours. With end-point analyses, digital computing equipment can be used not only to control system variables for optimum conditions, but also to program exceptions, emergencies, shutdowns, and start-ups.

Today's desire and need for companies to procure packaged installations has been increased by complexity of special purpose instruments, rapid growth of instrumentation in all fields, and the formidable array of specialized skills in the physical sciences necessary for advanced system design.

Finally — today's justification of much data processing and control instrumentation is still on a dollars and cents basis. Current applications are normally pointed toward specific and prompt cost reductions, where dollar savings are relatively easy to foresee — and large in magnitude. The need for fast payback may have certain disadvantages but it is not really surprising.

(For more information on data processing equipment and its uses in the chemical processing industries, check 5515 on form opposite last page.)

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THESE RELIANCE FEATURES offer you the best motor for your pump installations.

Totally-Protected, weather tight construction—Corrosion-proof cast iron housing and sealed conduit box with threaded inlet locks out water, dust and foreign matter.

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Air pollution photometer

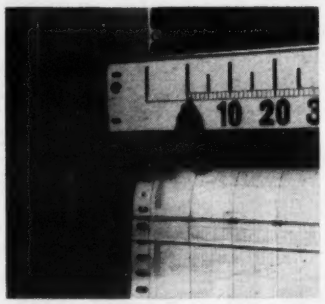
Optical and electronic system of air pollution photometer is described and illustrated in eight-page bulletin. Applications, sensitivity ranges, and other engineering data are included for instruments to measure and control outdoor and indoor air pollution. Bul JM-1000-C — Phoenix Precision Instrument Co., Dept. CP, 3803-05 N. Fifth St., Philadelphia 40, Pa. Check 5517.

Integrator 'reads' area under stripchart curve for quantitative data

Converts standard recorders to chromatography use

Uses: As "package" unit for converting manufacturer's recorders into integrators for measurement of area under stripchart curves.

Features: Integrator shows value of area in form of a digital readout and also by a "pipping" pen producing pips at rate of 500 per minute.



"Pipping" at rate of 500 ppm, integrator gives percentage of each chemical component

Description: Pips are made at lower edge of chart. Value of each chemical component can be determined by counting pips and dividing quantity into total. Result is a quantitative percentage. Each tenth pip is longer to facilitate counting.

Integrator comes as "package", designed for attachment to recorders already in service. Instrument consists of three parts: retransmitting slidewire for transmitting pen position, converter for inte-

J. G. ZIEGLER, Pacific Coast Sales Engineer, a member of the Taylor Team of Instrumentation Scientists, is known internationally in his field. Together, the well-known team of Ziegler and Nichols have collaborated on such published papers as "Optimum Setting for Automatic Controllers," "Industrial Process Control," "Dynamic Accuracy in Temperature Measurement," "Valve Characteristics and Process Control," and many others.

N. B. NICHOLS, Chief Engineer, Taylor Instrument Companies, also has an international reputation as an instrumentation scientist. He was called to MIT during the war to work in the servomechanisms laboratory and later as group leader of the fire control division of the radiation laboratory. He edited a book on servomechanisms, and along with John Ziegler has authored a number of papers on the science of process control.

Bring your problems to these top

GEORGE E. HOWARD, Manager of the important Application Engineering Department of Taylor Instrument Companies, has had over 20 years experience in the design and application of engineered control systems, specializing in the Chemical, Petroleum and Textile Industries. During World War II Mr. Howard trained Government personnel on instrument operation and maintenance at the Government's Oak Ridge Atomic Energy Plant where Taylor was the prime contractor on instrumentation.

RICHARD N. POND, Vice President of the Instrument Society of America and a member of the Executive Board, has served the society in a variety of capacities since he first became active in the St. Louis chapter in 1946. He was secretary, and later chairman, of the committee on Instrumentation for Production Processing. He is a Divisional Sales Manager for his company, specializing in Oil Refining, Petrochemicals, Brewing, Power, Rubber and Plastics.

WE'RE FIELDING our first team at the ISA Show in Cleveland. There will be 27 top Taylormen there—the 4 shown and 23 listed below. We're proud of the ability and experience of this team.

They'll be there—with headquarters at Booth 949-955—to put their skills to work on your own specific instrumentation problems. These men, drawn from our application engineering and sales departments, take to the show broad backgrounds of successful experience in the solution of instrumentation problems throughout the processing industries. They will be there only because you are going, too—so, why not stop by and put them to work on your plant's problems?

These men are typical of the world-wide Taylor sales and engineering organization that stands ready to help you with your instrumentation problems. Taylor Instrument Companies, Rochester 1, N.Y., and Toronto, Canada.

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R. F. Maurer
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grating signal, "pipping" pen in recorder case.

Special chart has been developed for use with instrument. First inch is blank to accommodate pipping record. Remaining ten inches are divided into inches and tenths, as are time ordinates also. Manual area determinations can thus be simply made.

Converter mounts atop recorder or can be remotely located. Chart speed of recorder can be varied from 2 to 4 to 6 inches per minute with easily interchanged gear train. Cost is approximately $800.

(Integrator is product of Brown Instruments Division, Minneapolis-Honeywell Regulator Company, Dept. CP, Wayne and Windrim Ave., Philadelphia 44, Penna. . . . or for more information check 5519 on form opposite last page.)

Comparator bulletin

Bulletin of two pages presents data on high precision electromechanical data reduction machine used to measure and record distance between points, and angular position of images on photographic film or glass plates. Photographs show close-up details of film handling mechanism and other components. Bul CR-190—Coleman Engineering Co., Inc., Dept. CP, 6040 W. Jefferson Blvd., Los Angeles 16, Calif. Check 5520.

CHEMICAL PROCESSING's Editors are always interested in the opinions of our readers. What are *your* views on the subjects we cover each month?

"Over The Reader's Shoulder" (page 12) will publish as many letters each month as is possible. Let us hear from you.

. . . never fails

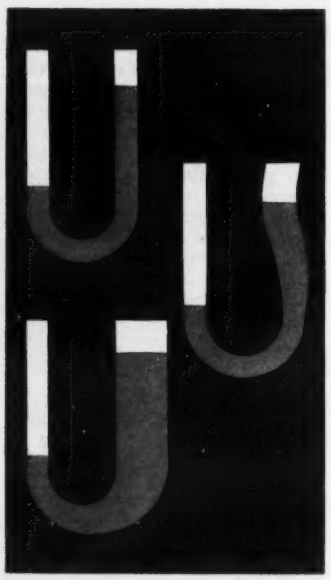
Accuracy unaffected by tube size or shape

Regardless of any difference in the size or shape of U-Type manometer legs, the *difference* between column heights will always be a true indication of the unknown pressure. More details in Bulletin G-14.

A manometer is operated by the force of gravity. Its perfect reproducible accuracy depends on nothing else. That is why a manometer is always accurate . . . today, tomorrow and forever. Calibration is never required . . . never subject to question.

This unfailing accuracy is the reason why manometers are the primary standard by which other instruments are judged, calibrated and verified.

Accuracy and dependability go hand in hand in the broad line of Meriam Manometers. For this reason, they are being specified for an ever increasing number of industrial as well as laboratory applications . . . wherever dependable, low cost, low maintenance instrumentation is desired.



NEW

. . . complete and informative guide to manometer theory and practice as well as manometer models for plant, field and laboratory use. Just ask for Bulletin G-14. The Meriam Instrument Company, 10920 Madison Avenue, Cleveland 2, Ohio.

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MERIAM MANOMETERS

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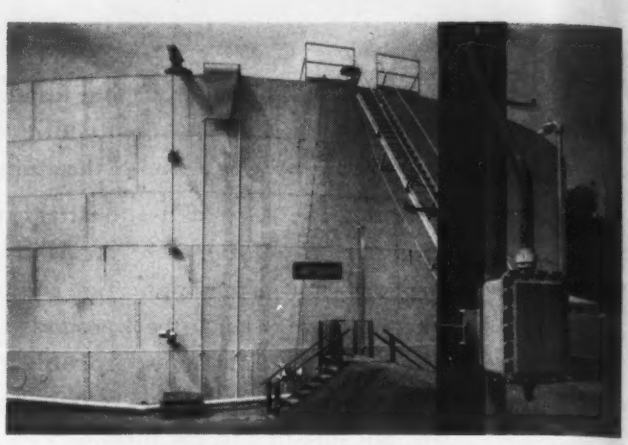

Typical gage installation on one of eleven tanks in tank farm of major oil company. Information from tank is flashed from tank gage to receiver in central office. Operator receives data within five seconds

'A difference of only 1/8 of an inch on a one and one-half million barrel reservoir represents nearly 800 barrels of oil, worth over $2000.'

Telemetering system flashes level data with vital accuracy . . . to nearest 1/8 inch

WILLIAM C. CLARKE,
Assistant Editor

Problem: A difference of only 1/8 of an inch in liquid level of a reservoir in one of the major oil company's tank farm at Wilmington, California, represents nearly 800 barrels of fuel oil worth over $2,000. Over $3,500,000 worth of oil can be stored at one time in the huge 1,500,000 barrel reservoir. Conventional methods of hand-gaging, dropping a tape line weighted by a plumb bob, can involve inaccuracies. Variations due to reading habits of the gager, plus gaging accidents as plumb bob resting on a high point in tank, can mean important dif-

Receiver is flush mounted on control panel just to left of dial. Pegs show tank inventory. Schematic of entire tank farm is at left

ferences . . . and improper gaging of liquid levels.

Also — an important problem is handling transmission of oil from one tank to another. Various tanks' contents must be kept balanced and an accurate record of inventory position maintained.

Solution: Installing a combined tank gage and telemetering system on tanks and reservoirs, this company has reduced all gaging problems to a minimum. Highly accurate tank gages on reservoirs, and tanks furnish liquid level data to a receiver located in central control office. By simply dialing tank number on pulse code telephone-like dial, an operator can quickly obtain liquid level of any tank or vessel located on the farm. Reading is flashed on the receiver and is charted in five seconds. Liquid level data appear on gaging system receiver mounted near a graphic diagram of entire tank farm layout.

Using a system of peg indicators, working tanks are charted on control panel. Schematic layout of tank system assists in directing any necessary change in flow of oil.

Entire system of tank gaging is based on "pulse code" method of transmission. By an arrangement of dots and dashes for each one-eighth increment of liquid level, separate and distinct measurement code is developed for each tank. Tank levels can be measured from zero to 59 feet 11⅞ inches. Each code group, as transmitted from gage located on tank, is an entity in itself. Partial codes or grouping of codes are not used. Loss of any part of code produces a signal without any meaning whatsoever to receiver, and, consequently, no indication appears. False signals are thus ignored.

Output of receiver system is in digital form. While not used at this installation, output data could be used for input for computers, printing systems, and warning units. Automatic sequencing units could be added for a com-

Turn to page 80

little valves cast big shadows

Among Hoke's achievements with small fluid control products is the standard A431 Packless Valve pictured. We hadn't designed it as such, but this valve is one of our contributions in the field of atomic energy. Radiation Counter Labs utilizes this Hoke valve to introduce radioactive samples into their 4 pi Flow Counter. A little radiation goes a long way, and it takes a pretty hot instrument to count the number of atoms disintegrating per second in a sample. Needless to say, leakage would be inexcusable — what with scattering, self-absorption, secondary radiation, inverted gamma rays and other scandalous goings-on making it rough for the atomic scientist. To prevent such problems, this valve is helium leak tested at the brass bellows seal and air tested at the seat (These are routine tests performed on valves in standard production). Helium seat tests are performed when high-pressure is a factor.

There are many other manufacturers like RCL who consider Hoke valves with the same sense of reliability. Sometimes pressure is the important factor . . . or precise control of flow . . . or even simply attractiveness of design. But whatever the application, producers of quality test and production equipment are cognizant of the craftsmanship in Hoke products; and the users of such equipment often look for Hoke valves as assurance of equipment dependability.

Little valves do cast big shadows!

See Hoke Valves at Booth 1316 ISA Show, Cleveland Aud., Sept. 9-13

HOKE, INCORPORATED, FLUID CONTROL SPECIALISTS, 145 S. DEAN ST., ENGLEWOOD, N. J.

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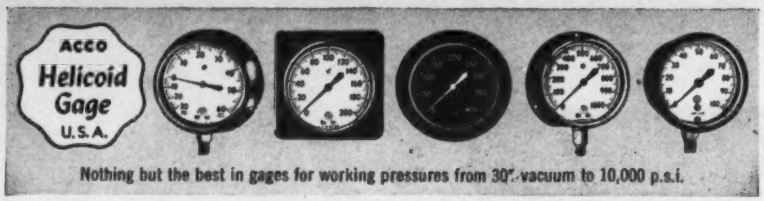
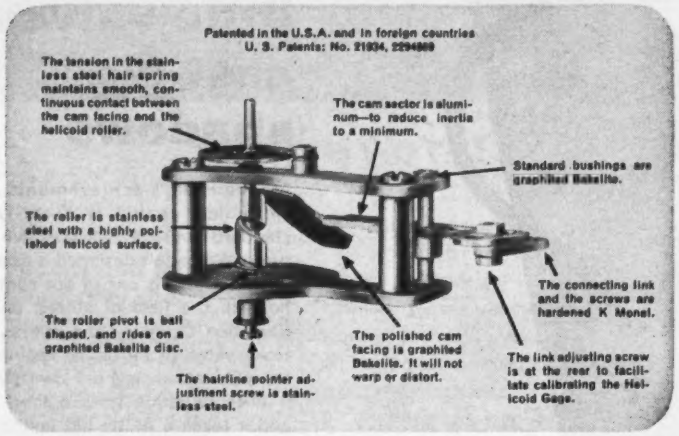


Nothing but the best in gages for working pressures from 30"-vacuum to 10,000 p.s.i.

These details of Helicoid gage design assure longer life and enduring accuracy


Patented in the U.S.A. and in foreign countries
U. S. Patents: No. 21934, 2294869
The tension in the stainless steel hair spring maintains smooth, continuous contact between the cam facing and the helicoid roller.
The cam sector is aluminum—to reduce inertia to a minimum.
Standard bushings are graphited Bakelite.
The roller is stainless steel with a highly polished helicoid surface.
The connecting link and the screws are hardened K Monel.
The roller pivot is ball shaped, and rides on a graphited Bakelite disc.
The polished cam facing is graphited Bakelite. It will not warp or distort.
The link adjusting screw is at the rear to facilitate calibrating the Helicoid Gage.
The hairline pointer adjustment screw is stainless steel.

The superiority of Helicoid Gages is most evident in severe service—wherever a gage is subjected to violent pressure pulsations or severe mechanical vibrations.

The *sustained accuracy* of Helicoid Gages over *millions of cycles* is explained by the details of design and construction of the Helicoid movement shown above. Such Helicoid features—protect against wear and corrosion and assure sensitivity, sustained accuracy and trouble-free operation.

The Chemical Gage

The Helicoid Chemical Gage has a guaranteed accuracy of plus or minus 1%. It is applicable for working pressures from 30" vacuum to 5000 p.s.i. and temperatures to 400° F. It is particularly suitable for chemicals and other viscous fluids which might clog or corrode a Bourdon tube. Pressure and/or vacuum is transmitted directly to the indicating gage element through deflection of a Teflon or Kel F sealing diaphragm.

Tubes built for millions of pressure pulsations

To fit the wide range of applications, Helicoid Bourdon tubes are available in four materials —alloy steel, K Monel, stainless steel and phosphor bronze.

All Helicoid tubes are made from seamless tubing and are carefully designed to give maximum torque and minimum stress. When used within the dial range, they will withstand many millions of pressure pulsations and will not stretch, leak or crack.

For complete information on the Helicoid line of gages write for **Catalog G-52**

Helicoid gives you all these features at prices that are competitive in the quality gage field.

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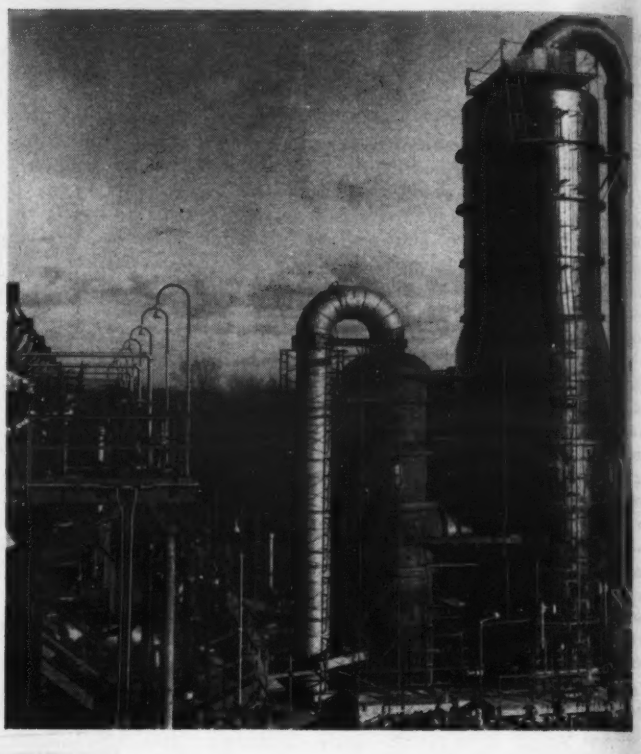


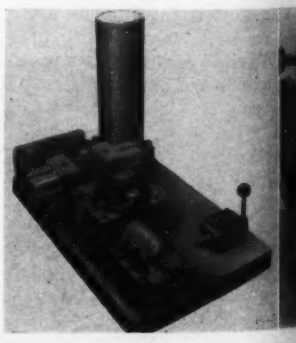
Switching from electrical to hydraulic operation of control valves, Texas Butadiene & Chemical Corporation . . .

drops control valve power needs by over 90 percent

. . . operates 98 gate valves throughout plant on only 30 hp, instead of 400-500 hp

Problem: When Texas Butadiene & Chemical Corporation, Houston, made plans for an automatic, multi-million dollar butadiene processing plant, designers estimated that an electrical motor driven system to control flow valves would require between 400 and 500 horsepower.

Conventional control lacked flexibility needed to compensate for changes in product viscosity. To gain flexibility and increased operating speeds would have required unweildy installations of motor control. Air diaphragm operation would limit valve size.



Panel-mounted valve and filter assembly controls one of seven cylinder-operated gate valves on each butadiene reactor

Partial view of butadiene processing plant. An all-hydraulic system controls and operates 98 gate valves. System uses only 30 horsepower from one power source

Processing of butadiene, used in synthetic rubber and some plastics, requires precise control over ingredient flow volume and velocity, as well as sequencing of ingredients into reactors.

Solution: Company installed an all-hydraulic system using only 30 horsepower *from one source* — a central power unit — to control and operate product valves.

Product gate valves are operated by small, light hydraulic cylinders, in turn operated by solenoid valves located at central control panels. Gate valves range in sizes from four up to thirty inches. Operating times are as low as one second for smaller valves to four seconds for the larger ones.

Independently operating control units were designed to control 98 gate valves involved. Each unit controls necessary gate valves for seven reactor vessels, seven gate valves for each reactor. Steel mounting panels for all valves and filters for each gate valve are grouped within a weather-resistant cabinet. Seven panels are contained in each cabinet, plus an eighth panel to

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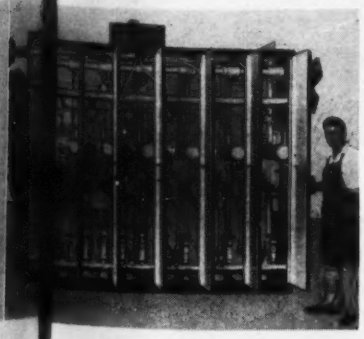

Complete hydraulic unit for operating seven gate valves of one reactor vessel. Eighth panel operates reactor by-pass valve during emergency

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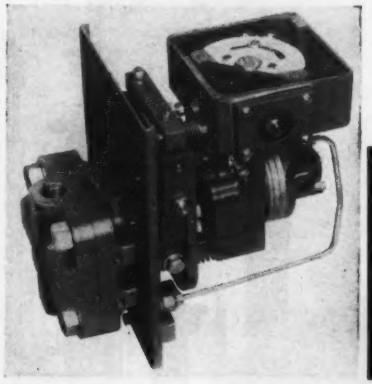
TYPE VP

Pressure Transmitter
Standard Ranges
0-150 to 0-4000 psi
0-60" H_2O to 0-150 psi
0-1½" to 0-60" H_2O

- **Null-balance-*vector* design permits 20-to-1 range adjustment without re-setting zero!**
- **Suppression of range lower limit simply adjusted up to 50% of span!**
- **New compactness and weight saving solve most location problems.**
- **Low air consumption.**
- **Simplified, accessible mechanism for quick and easy servicing.**



TYPE VDP

Differential Transmitter
Standard Range
0-15 to 0-300" H_2O

Republic has *literally* figured all the angles to bring you this new "family" of pneumatic transmitters for pressure and differential pressure. The null-balance-*vector* units are compact, easy to install and adjust, and permit range changes far beyond any pneumatic instruments previously available to industry—and *without changing* parts. You need only a screwdriver and reference gauge to change either the upper or lower range limit!

Adjustment time is radically cut since re-zeroing of the instrument is seldom needed when the upper range limit is changed. Unusually large changes in plant operating conditions can be accommodated quickly and without new or modified equipment, simply by loosening a set screw and moving one linkage component.

Republic Type VP and VDP pneumatic transmitters normally provide standard 3-15 psi output signal pressures. Air consumption is only 0.2 scfm since air flow virtually stops as soon as the transmitter balances each input signal change. And all Republic null-balance-vector instruments have top sensitivity *and* stability. Lightweight tension members in the balancing linkage respond quickly to pressure or differential changes and do not overshoot or "hunt" the balance point.

Whether your plant conditions change frequently or you just want the best sensitivity, accuracy and reliability available in pneumatic transmitters, you should get the full details on Republic Type VP and VDP transmitters.

WRITE FOR REPUBLIC FOLIOS NO. 56-12 AND 56-13A TODAY... and keep an eye on Republic for new developments "in the works" now to help you with your most critical operating instrument problems.

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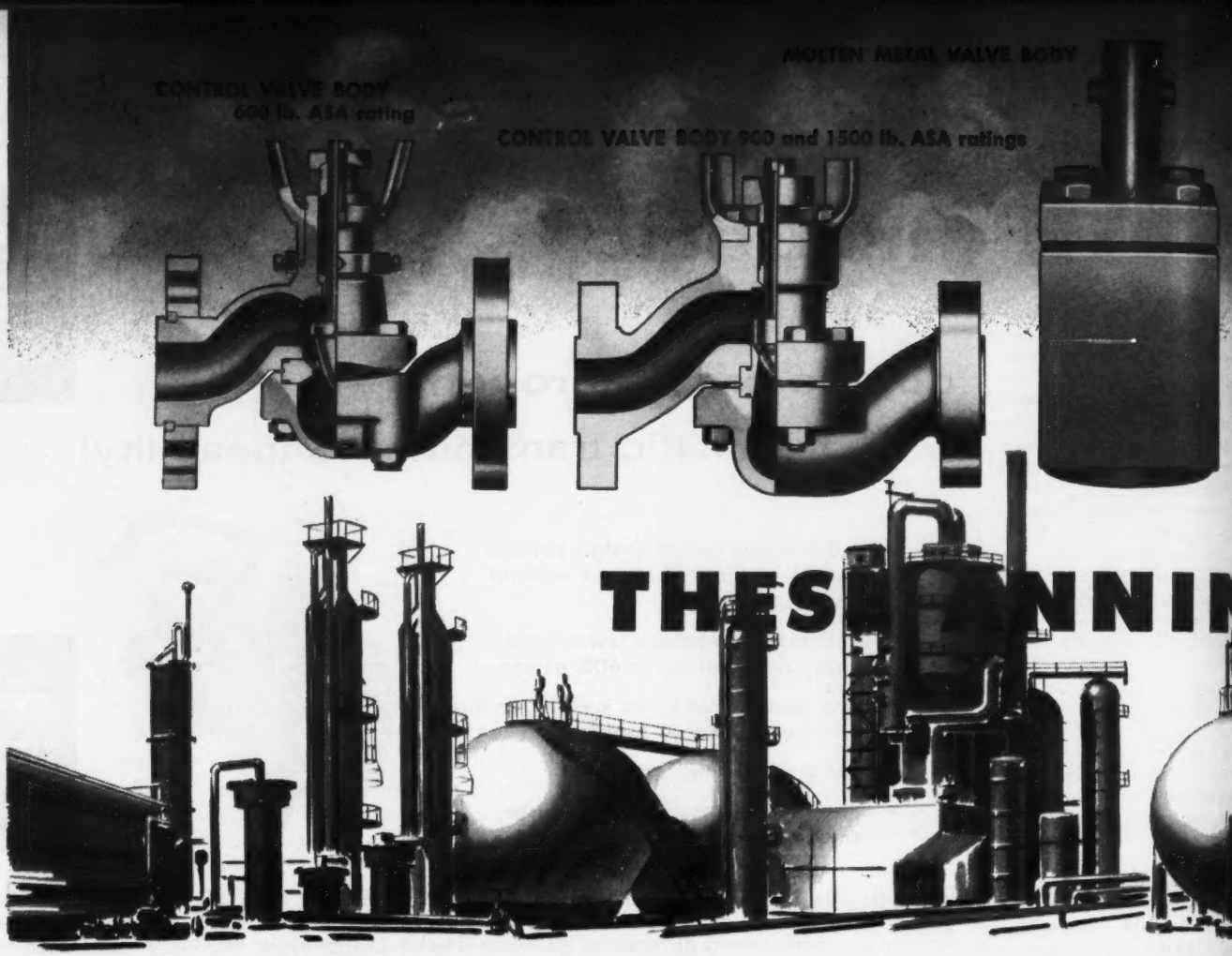

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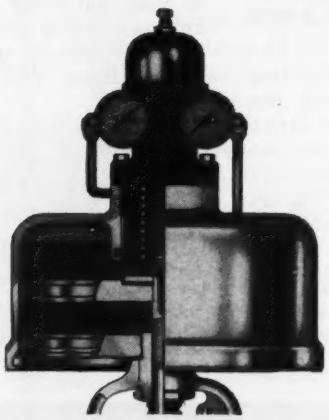
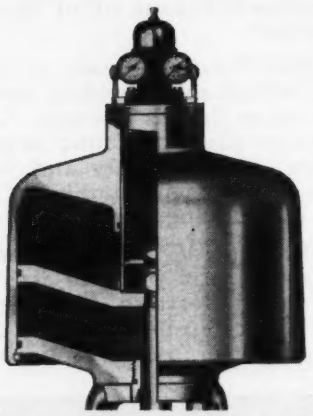
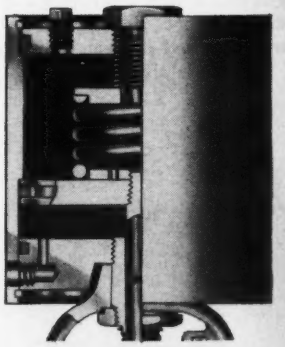


DOMOTOR OPERATORS

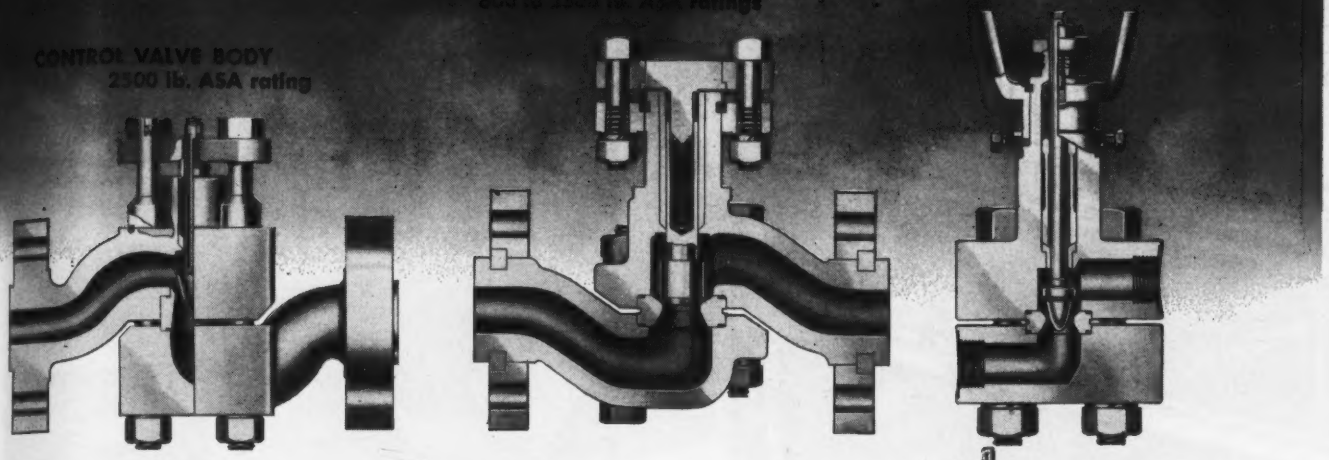


BUNYAN DOMOTOR OPERATORS



CYLINDER OPERATORS

ANNIN CONTROL VA



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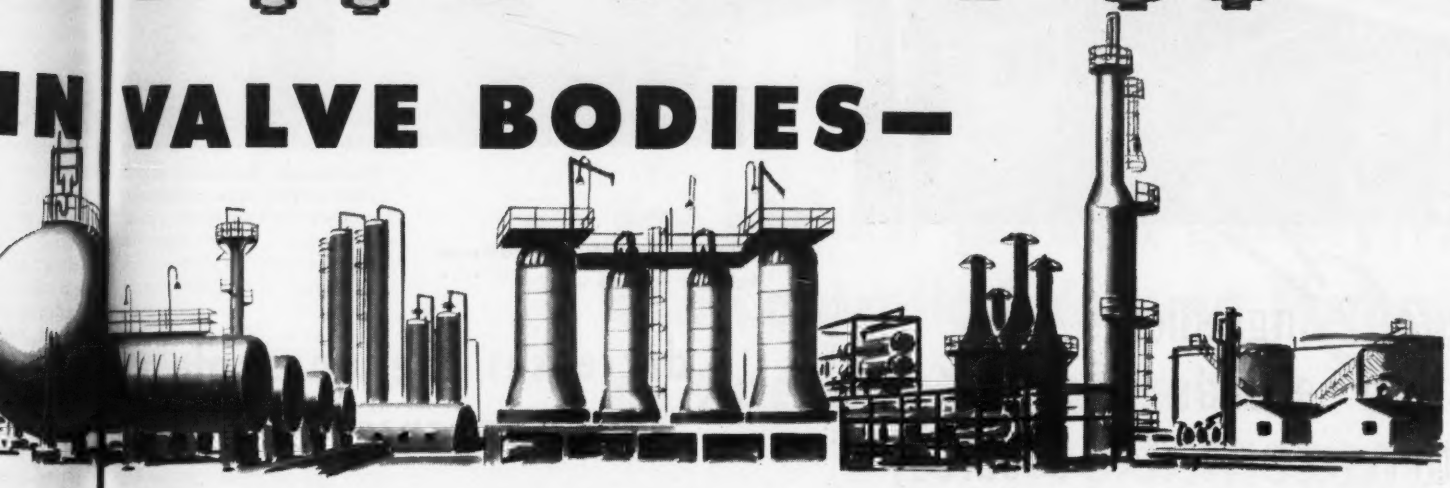
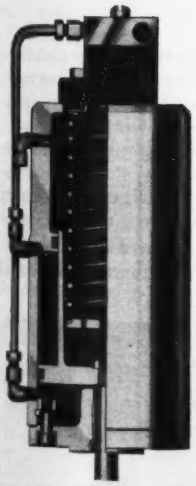


IN OPERATORS...



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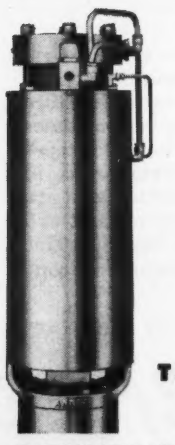

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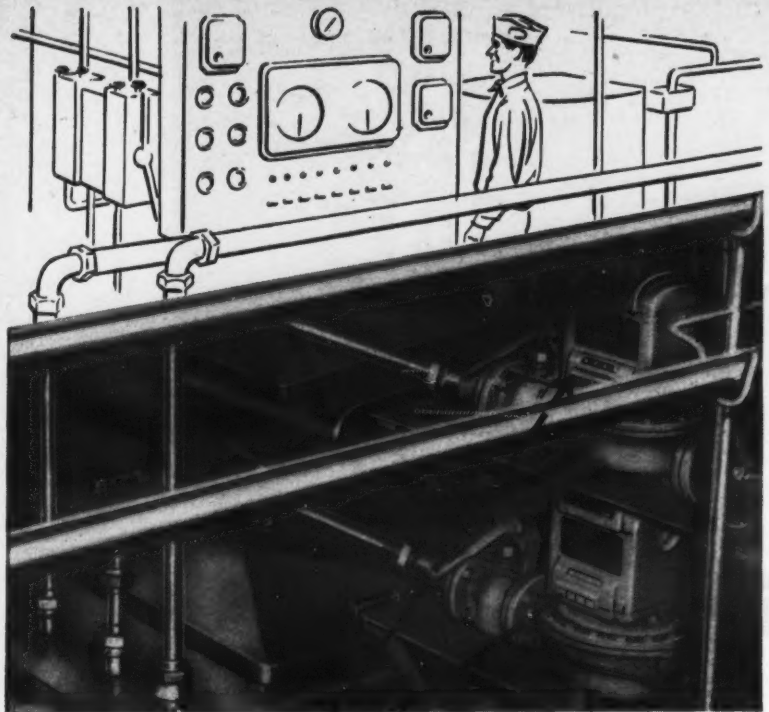
12th Annual ISA Instrument-Automation Conference and Exhibit
September 9-13, Cleveland, Ohio



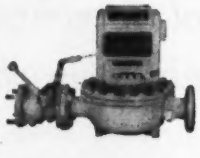
Measure 2 ingredients
in just 15 seconds
with *automatic* accuracy

That's all it takes for a man to set quantities and open valves on the accurate Auto-Stop meters feeding two liquids to a batch. Then he's *completely* free to devote full time to other details. The meters shut off precisely, automatically.

Think of the time saved! All liquids measured simultaneously. No waiting for weigh tanks to fill, or "inching" up to the marks on gauge sticks. No wrestling with bags or buckets. No mess, no drip, no hazard.

And think of the materials you save! Eliminates rejected batches, prevents waste of expensive materials. You get quality control like you've never had before, and each meter has a totalizer for accurate cost and inventory control.

This Auto-Stop batching meter is only one of many Neptune meters for accurately measuring more than 150 industrial liquids... from simple water meters to ticket-printing meters, electric switch adaptations for cycling control, and specially engineered remote control systems.
Ask for free Bulletin 567- FP.



neptune
liquid METERS

NEPTUNE METER COMPANY
19 West 50th Street, New York 20, N. Y.

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When inquiring check 5526 opposite last page

Thermocouple Restorer is actuated by push-button at Davison Chemical plant

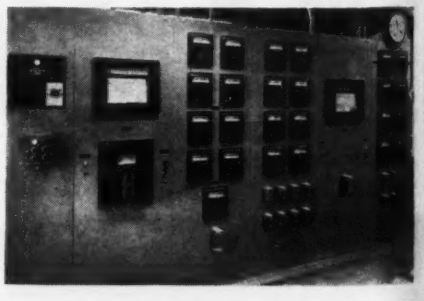
Device detects and corrects circuit failure —

decreases thermocouple maintenance 75%

GORDON WEYERMULLER, Associate Editor
With **A. A. ZIMMER,** Manager
Engineering and Maintenance
Davison Chemical Co., Div. W. R. Grace & Co.
Baltimore, Maryland.

Problem: At Curtis Bay, Md., catalyst plant of Davison Chemical, process temperature measurements were sometimes inaccurate due to faulty thermocouples. Thermocouples in use in this particular area are exposed to corrosive gases and occasional high humidity. This caused deterioration of connections between the points of the thermocouple and between thermocouple and the connecting lead wire.

Solution to problem was imperative since continuous operation of catalyst plant could not be assured without constant instrument control. Unreliable temperatures could



Thermocouple detection device helps maintain accuracy of a number of the instruments on this panelboard

result in the production of material that did not meet specifications.

Solution: In August 1955 plant installed an instrument which detects and repairs faulty thermocouple circuits. The device, known as a Restorer, first disconnects the pyrometer to prevent its being damaged. Then an impulse — 400 volts or less — is sent through thermocouple circuit. This impulse re-fuses line breaks or separated thermocouple tips and restores proper conductivity through high resistance (loose, oily, or corroded) connections. It even temporarily repairs certain partially deteriorated thermocouples. Unit indicates which thermocouples will need permanent repairs. Important thing is that operation can continue on schedule, needed repairs being made at a time when they will not hinder production.

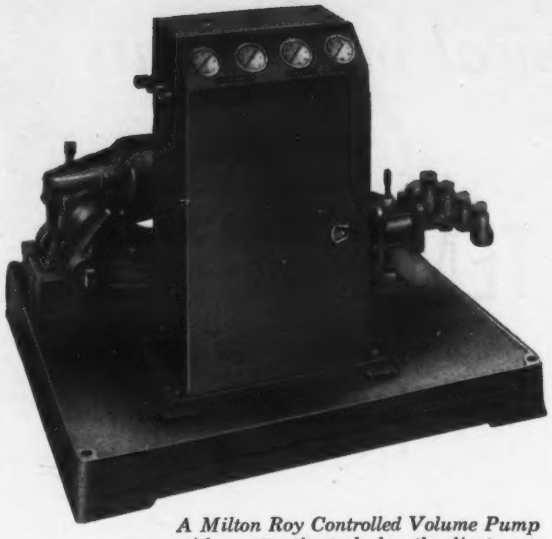
At Davison the device is operated once per shift for a period of two seconds. This serves to reweld any open circuits and keeps the catalyst unit in continuous operation.

Results: Instrument foreman, E. Jones, estimates that since the Restorer was placed in service, thermocouple maintenance on operating unit has been cut by about 75%. Installation has permitted control instruments to operate continuously and helped to maintain the high quality of the product.

One additional advantage obtained in the use of the device which was not expected was the knowledge that the thermocouple and its connections was either operative or inoperative. After pushing control buttons, resulting light shows continuity of the circuit. If there is no light, the circuit is open either in the thermocouple or its associated wiring. This allows the instrument man to know immediately if the difficulty is in the instrument or the thermocouple and its lead wire.

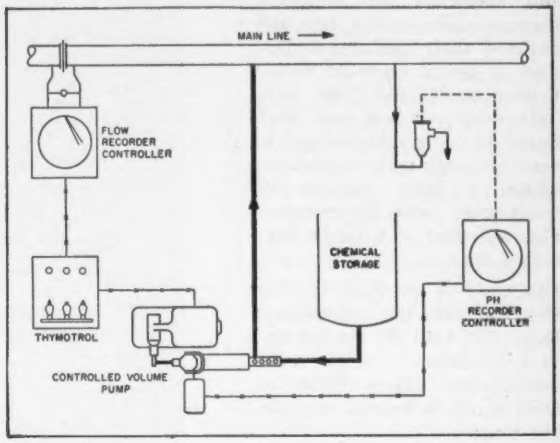
A definite savings in downtime while locating instrument faults has occurred. Savings

Turn to next page



A Milton Roy Controlled Volume Pump with pneumatic stroke length adjustment.

In pH control systems, such as the one illustrated, flow rate may vary. To keep the chemical feed in proportion to the varying flow rate, an open loop chemical feed control system is added to the closed loop pH control system, which automatically adjusts chemical feeding rates for changes in pH. A Milton Roy Controlled Volume Pump through speed and stroke length adjustment acts as final control element for both flow and pH controllers.



For highest product quality... use Controlled Volume Pumps as final control elements

Ultimate quality of your product is assured when you use Milton Roy Controlled Volume Pumps to regulate feed and distillate rates. As final control elements in the control loop, they contribute to accurate regulation of your process variables . . . are accurate in delivery within ± 1%.

Milton Roy Controlled Volume Pumps also serve as flow controllers . . . simultaneously metering and pumping process fluids. Or, they can serve as ratio controllers . . . maintaining a fixed relationship between any number of process streams. Available in simplex, duplex, and multiple liquid end types. Capacities from 3 milliliters per hour to 22.5 gpm per liquid end. Pressures to 50,000 psi.

If you'd like to discuss Controlled Volume Pumps in more detail, visit our booth at the ISA Show . . . No. 1339. Milton Roy engineers will be glad to show you how these pumps can provide a solution to your low-capacity flow control problems . . . how these pumps fit into the process instrumentation picture.

MILTON ROY COMPANY, *Manufacturing Engineers*, 1300 E. Mermaid Lane, Phila. 18, Pa.

VISIT OUR BOOTH NO. 1339, 1341 at the ISA SHOW SEPT. 9 to 13, 1957

Engineering representatives in the United States, Canada, Mexico, Europe, Asia, South America, Australia, Africa.

milton Roy
CHEMICAL FEED SYSTEMS

When inquiring check 5527 opposite last page

Starts on page 78

have also been made in labor and materials for replacing thermocouples before they had outlived their usefulness. Device is not a cure-all to all thermocouple and lead wire difficulties — but has been found to be a valuable aid to assure continuous operation where a large number of small-gage wire thermocouples are used in a fairly corrosive area.

(Restorer is product of The Peerless Electric Company, Dept. CP, 1450 W. Market St., Warren, Ohio . . . or for more information check 5528 on form which is located opposite last page.)

Telemetering System

Starts on page 72

pletely automatic gaging system.

Not limited to liquid level telemetering, tank gaging and transmission system, with some additional equipment; will operate supervisory control equipment as valves, pump motors, and transcribe all information at pre-determined intervals with an electric servo-writer.

Results: Since installation of tank gaging and telemetering system at a major oil company's tank farm two years ago, intrafarm pumping problems have been reduced to a minimum. Not only is complete information on each tank and reservoir available at all times, but tank farm operators can secure the data without moving from central control office. Liquid level information is flashed with vital accuracy to nearest ⅛th inch on each tank. On a cost basis alone, installation has been justified.

(Varec "Pulse Code" Telemetering System is product of The Vapor Recovery Systems Company, Dept. CP, 2820 N. Alemeda Street, Compton, California . . . or for more information check 5529 on form opposite last page.)

Mechanical instruments for

TEMPERATURE

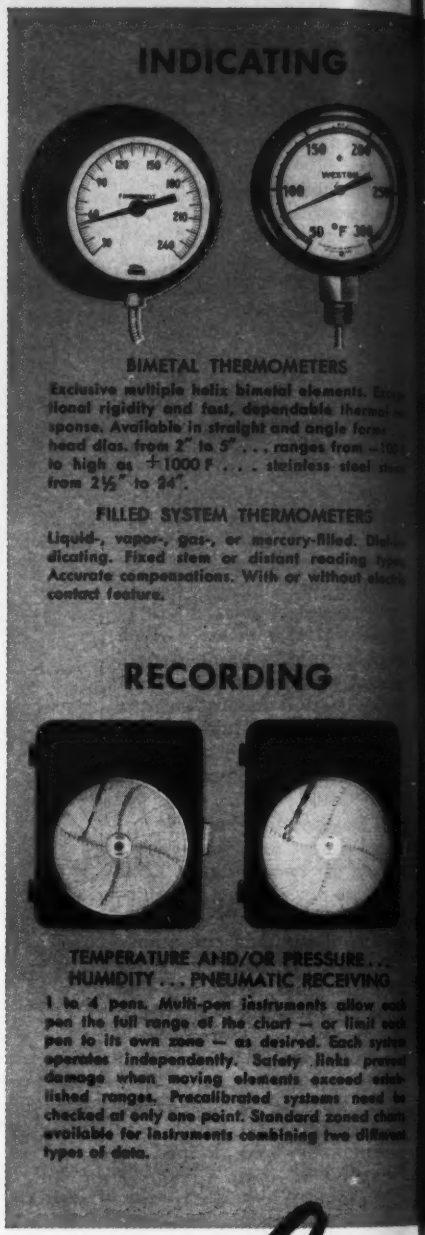
PRESSURE

VACUUM

HUMIDITY

LIQUID LEVEL

PNEUMATIC RECEIVING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BIMETAL THERMOMETERS
Exclusive multiple helix bimetal elements. Exceptional rigidity and fast, dependable thermal response. Available in straight and angle forms . . . head dias. from 2" to 5" . . . ranges from −100 to high as +1000 F . . . stainless steel stem from 2½" to 24".
FILLED SYSTEM THERMOMETERS
Liquid-, vapor-, gas-, or mercury-filled. Dial-indicating. Fixed stem or distant reading type. Accurate compensations. With or without electric contact feature.
RECORDING
TEMPERATURE AND/OR PRESSURE . . . HUMIDITY . . . PNEUMATIC RECEIVING
1 to 4 pens. Multi-pen instruments allow each pen the full range of the chart — or limit each pen to its own zone — as desired. Each system operates independently. Safety links prevent damage when moving elements exceed established ranges. Precalibrated systems need be checked at only one point. Standard zoned charts available for instruments combining two different types of data.

Weston supplies t

Looking for the right mechanical instrument? No need to compromise in any particular! You'll find *exactly* what you need within the complete WESTON line . . . one that will fill your requirements efficiently, and most economically. And you'll get the advanced design, rugged construction, and the dependability that have kept Weston the leader in precise instrumentation for close to three quarters of a century. For complete information on any of these mechanical instruments, contact the Weston representative in your vicinity, or write, Weston Electrical Instrument Corp., 617 Frelinghuysen Avenue, Newark 5, N. J.

Hydraulic Valves

Starts on page 74

operate an emergency reactor by-pass valve.

Power unit for system includes two electric motor-driven positive-displacement pumps, with a third stand-by steam turbine-driven pump. To satisfy instantaneous power demands during system's 20-minute cycle, and to reduce overall horsepower requirements, system uses ten 10-gallon hydro-pneumatic accumulators. These discharge 20 gallons of oil every three minutes during the peak demand times for circuits.

One major problem facing engineers in design of system was need for lower pressures to close — and higher pressures to open — to avoid seat jamming. Connecting the "close" cylinder port to a pressure-reducing valve maintains a reduced force on a closed valve. A second problem was designing a method for a long, slow opening. Metering the exhausting oil from the cylinder overcame the problem.

Results: Control wiring and size of installation are about one-tenth of that needed by a similar conventional control system. Power requirement of only 30 horsepower is much less than an estimated 400-500 horsepower of an electrical control system.

Increased flexibility has been attained since rate of gate-valve travel can be easily varied at any point in the stroke. Slow stops and starts can be developed by simple external valving.

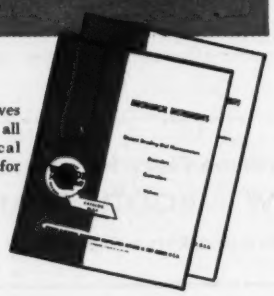
(Hydraulic system was designed and built by Rivett, Inc., Dept. CP, Brighton, Boston, Mass. Check 5531 on form opposite last page.)

Controllers

Manufacturer's instrumentation and control equipment for combustion, pressure, flow, temperature, and gas analysis is described in 12-page bulletin. Bul 57-687-297 — The Hays Corp., Dept. CP, Michigan City, Ind. Check 5532.

ALL PNEUMATIC CONTROL FORMS
NON-INDICATING CONTROLLERS . . .
temperature or pressure
RECORDING CONTROLLERS . . .
temperature or pressure
pneumatic receiving
temperature-humidity
Narrow and full range throttling, automatic reset and quick response control forms.
PROGRAM RECORDING CONTROLLERS . . .
temperature or pressure
Variable control according to predetermined time schedule, as established by contour of cam mounted on chart.
INDICATING CONTROLLERS . . .
temperature or pressure
Single, duplex, and double system models. Full-range control settings; all control forms. Standard temperature ranges up to 800°F. Pressure ranges up to 7500 psi or 150 mm of mercury vacuum.
liquid level — Bubbler-type elements.
'FAULTLESS' CONTROLLER
. . . temperature
Apparatus-mounted. Suitable for operation between —40° and 700°F. Dependable expansion-stem type. Operates on 18 psi air supply. Direct and reverse acting types.
SELF-OPERATING CONTROLLERS . . .
temperature or pressure
Self-contained instruments requiring neither compressed air nor electricity; employing only the power developed within their own systems. Valve sizes ½" to 2". All required ranges.
TIME CONTROLLERS . . .
temperature or pressure
'SIMPLEX' CONTROLLER
. . . pressure
Apparatus-mounted, or used remotely. Pressure is transmitted to controller, which positions the air valve, regulating pressure to the top of the diaphragm valve. Operates on 18 psi air supply.
DIAPHRAGM MOTOR VALVES
Valves for all kinds of control systems. Direct, reverse acting, and three-way types.

Catalog M-2-C gives complete data on all Weston Mechanical Instruments. Write for copy to-day.



Yes them all

WESTON *Instruments*

A DAYSTROM UNIT

When inquiring check 5530 opposite last page

New, *Transistorized* Temperature Controller

Provides

Much Greater Sensitivity
Long Life, Lower Maintenance

Use of **transistors,** rather than electronic tubes, in this ON-OFF signalling controller provides a tremendous increase in both the life and dependability of the instrument. Ruggedly constructed, it can withstand severe conditions of vibration and shock without loss of sensitivity or accuracy. Maintenance, naturally, is sharply reduced.

Available for either thermocouples or resistance bulbs, this transistorized controller also provides greatly increased sensitivity — acting on a temperature change of but ½°F. Use of regular A.C. line voltage eliminates the need of a standard cell and battery. **Periodic standardizing** to maintain factory accuracy of the null balance measuring circuit **is no longer necessary.** Calibration accuracy is guaranteed to within ¼ of 1% of scale span. Scale ranges are available for all standard calibrations — covering temperatures from minus 320°F. to plus 3000°F.

See This And Other Thermo Electric Products
At the I.S.A. SHOW — BOOTH 1461
Cleveland Auditorium • Cleveland, Ohio • Sept. 9-13

Thermo Electric Co., Inc.
SADDLE BROOK, NEW JERSEY
In Canada — THERMO ELECTRIC (Canada) Ltd., Brampton, Ontario

When inquiring check 5533 opposite last page

Development of industrial gas-chromatography stream analyzer is completed

"Plant-tested" process anal handles multi-component strea

Uses: Industrial process gas chromatography instrument will extend widely-used simple laboratory technique to continuous process stream analysis. Recently field-tested on analyses of butadiene product and raw material, alkylation feeds, ethylene, chlorinated hydrocarbons, and general refinery streams, continuous gas analyzer can be easily set up for multi-component streams. Application runs have already been made by the gas chromatographic analyzer on streams containing both olefins and paraffins from methane to pentanes and pentenes.

To-be-tested applications include gases i monia, and eth

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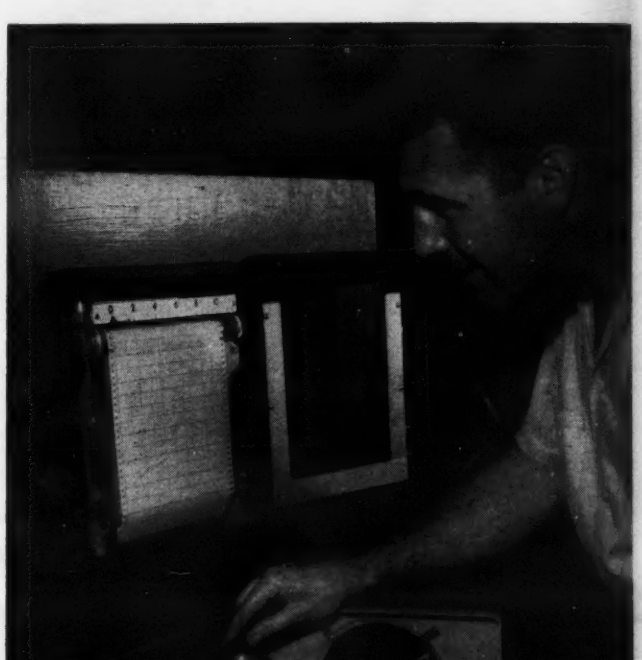

Adjustments on continuous process analyzer can be easily made. Self-calibrator of programmer unit is being checked with recording chart. Top of analyzer unit, in explosion-proof dome, can be seen at left

matography
completed

...analyzer ...streams

...inuous gas
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include analysis of synthesis gases in manufacture of ammonia, acetylene, methanol, and ethylene oxide.

Features: Unusual design of gas analyzer includes a complete thermostatting system in which all temperature-sensitive components (column, sample valve, sample volume, detector) are in direct thermal contact with "thermal sink". Temperature control is very exact — to 0.1°C. Internal heat exchangers are provided for both sample and carrier gas to assure constant temperatures for both.

Description: Continuous stream analyzer is result of accelerated test program (CHEMICAL PROCESSING - June, 1957) extending more than a year in the field. Ten interim models were set up on problems and placed in actual "in-plant" use before commercial version of instrument was finally designed.

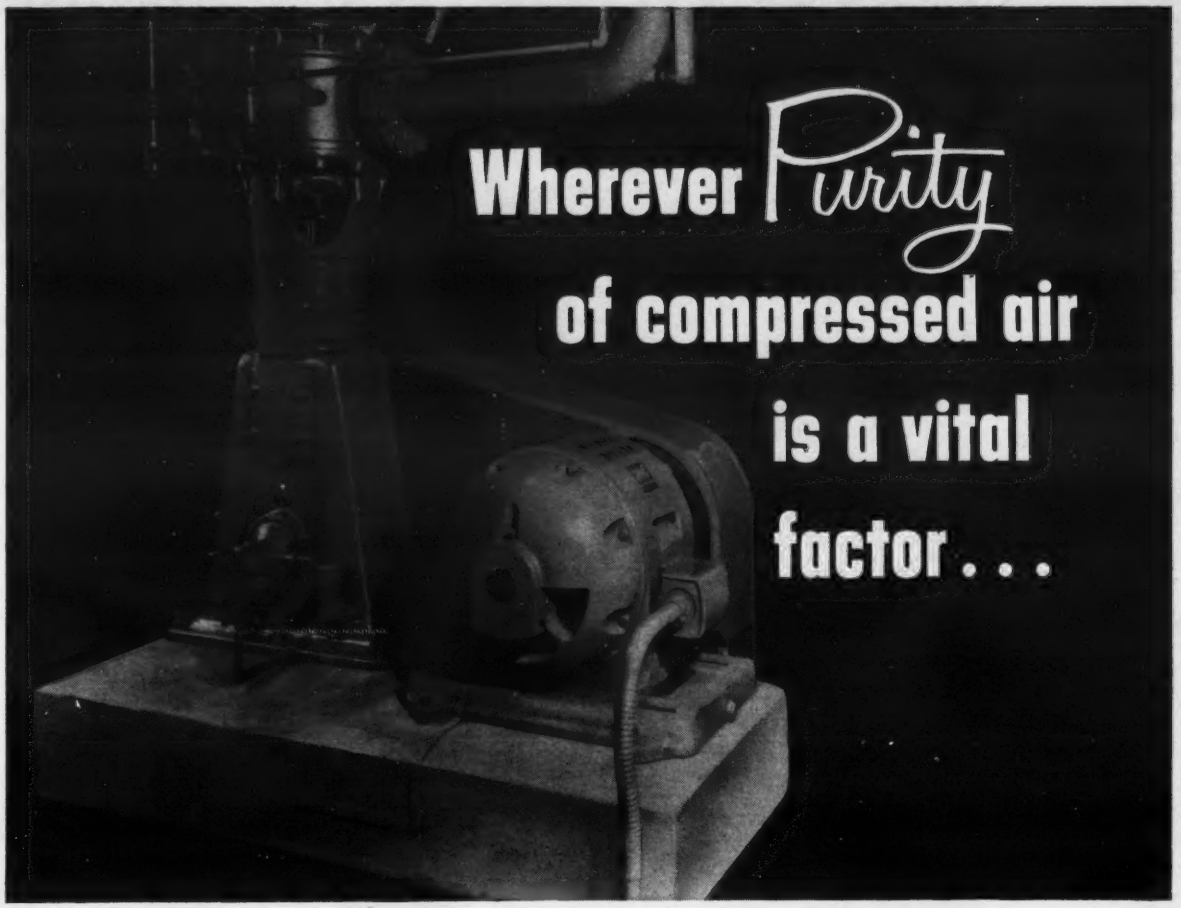
Continuous plant monitoring system consists of three units — an analyzer, a programmer, and a recorder. Analyzer is installed in plant close to sample take-off point. Programmer and recorder are installed in control room.

Many changes were made in final version of gas analyzer — as compared with interim models tested — to increase operating ease. A regulated power supply replaces batteries formerly used. Graphic disc timing system permits fast program set-up and change. All analyzer components were located for quick maintenance. High-sensitivity thermistor detectors are installed.

Some added safety factors were developed. Analyzer has

Turn to page 86

automation



...use JOY OIL-FREE compressors

HERE'S THE AIR YOU NEED FOR INSTRUMENT CONTROLS

Air to actuate instruments plays a vital role in the step towards automation. The compressed air that operates instruments must be free of oil and water—or the instruments may plug up and record incorrectly.

Joy Oil-Free Compressors will supply the oil-free air you need. These compressors use carbon-graphite piston rings that require no lubrication. *No* oil in the cylinders—*no* oil in the compressed air!

If you need oil-free air now—or think you may need it soon—take advantage of Joy's more than 25 years of experience with non-lubricated compressors. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** *In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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JOY... EQUIPMENT FOR INDUSTRIAL PLANTS... FOR ALL INDUSTRY

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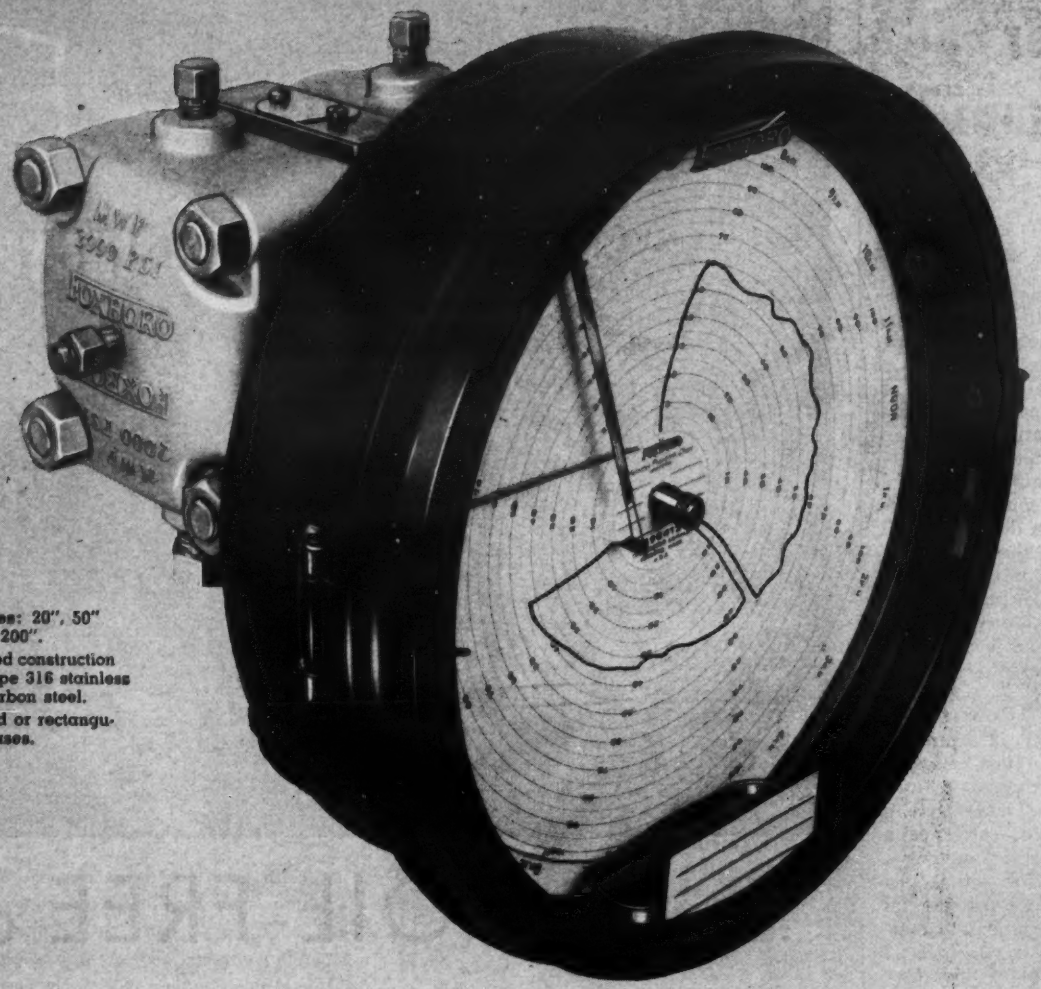
NOW... a "Dry" Flow Meter with...

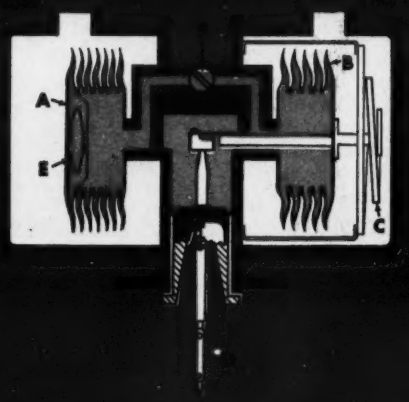


- Ranges: 20", 50" 100", 200".
- Forged construction in Type 316 stainless or barbon steel.
- Round or rectangular cases.

...the new Foxboro Type 37 Diaphragm Meter

How It Works

In schematic drawing at right, areas shown in color represent a stable, non-freezing liquid. Any pressure increase in the high pressure chamber compresses Diaphragm Unit A, displacing its liquid and expanding Diaphragm Unit B until force of Range Spring C equals the difference between the forces on Diaphragm Units A and B. Linear motion of Diaphragm Unit B moves inner end of Drive Bar D — outer end moves correspondingly through the bellows-sealed flexure bar, driving pen arm. Built-in Temperature Compensator (E) proportionately adjusts diaphragm capacity as ambient temperature variations affect volume of filling fluid. External damping adjustment is shown at F.



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ter

•complete overrange protection!

•sustained high accuracy!

Now you can have mercuryless flow measurement for a wide range of differential pressures — at static pressures up to 2000 psi — with greater safety and dependability than ever before! The new Foxboro Type 37 Diaphragm Meter not only combines unmatched ruggedness and precision in a dry meter — it's by far the easiest to adjust and maintain. And it does away with zero drift problems, once and for all! Expansible, Type 316 S.S. diaphragm elements respond to changes in pressure with unmatched sensitivity, yet are completely immune to overrange up to full static pressure! A unique packless drive bar precisely transmits linear motion to the pen arm. Range-changing is easy, due to new twin-spiral spring design. Wide range damping is externally adjustable under pressure. And the Type 37 is self-compensating for temperature changes in all differential ranges. Get full details on this high utility, completely dependable dry flow meter. Arrange for a demonstration with your nearby Foxboro Field Engineer, or write The Foxboro Company, 819 Norfolk St., Foxboro, Mass., U.S.A.

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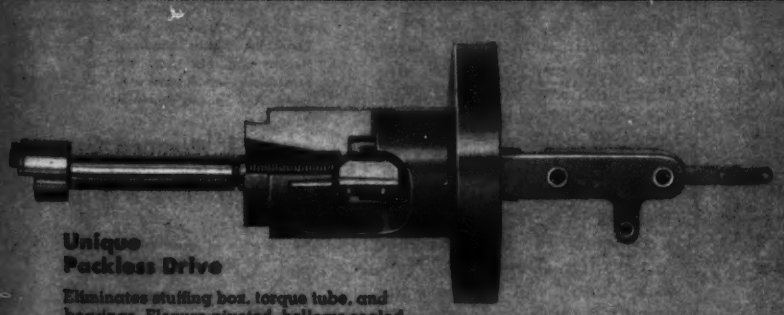
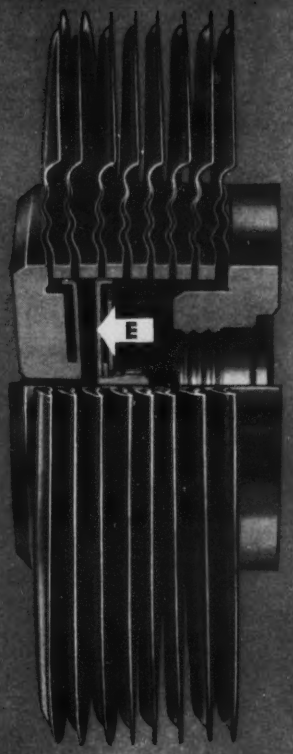
FIRST IN FLOW METERING



Unique Packless Drive

Eliminates stuffing box, torque tube, and bearings. Flexure-pivoted, bellows-sealed drive bar transmits diaphragm's linear motion to the pen arm with unequalled sensitivity and undiminished power. Seal for flexure pivot is a tough, flexible bellows.



Exclusive Diaphragm Elements

Type 316 S.S. diaphragm units in both high and low pressure chambers provide greatest linearity and freedom from hysteresis; nesting design and integral spacer rings provide safe, positive, overrange protection. Temperature compensation (E) is built into diaphragm assembly . . . never requires change or adjustment.

Exclusive Range Springs

Heavy gauge Ni-Span C alloy, twin-spiral springs provide high sensitivity with lasting accuracy. Readily accessible . . . range changes are easily made, in minutes!

For more information on product at left, specify 5535 see information request blank opposite last page.

You can't beat all-plastic Dekoron Poly-Cor for chemical resistance or for ease of installation. And now, the *new* Dekoron Instrument Tubing Harness adds yet another revolutionary feature—*fire resistance.*

For example, in the direct flame of a cutting torch, it lasted longer than any other multiple-tube harness. Use it in areas where flash fires are anticipated. And *new* Dekoron Instrument Tubing Harness is rugged, too. You can bury it and forget it.

You get all the advantages—chemical, impact and fire resistance—wrapped up in a single bundle with *new* Dekoron Instrument Tubing Harness. Remember, you can burn it . . . you can bang it . . . you can bury it. And you can *buy it now.*

AA-4622

Dekoron® products
QUALITY • RESEARCH • SERVICE

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MANTUA, OHIO

When inquiring check 5536 opposite last page

INSTRUMENTATION

Process Analyzer

Starts on page 82

a sealed and purged sample valve within detector block to insure against build-up of vapors inside explosion-resistant analyzer dome, should valve leakage ever occur. All exposed switch contacts have been eliminated in programmer component.

What are some of the instrument's limitations and analyses that it cannot handle? Instrument cannot analyze samples which are not in vapor phase at its operating temperature (50° to 100°C). And, of course, use of instrument is limited to analyses which can be made by gas chromatographic techniques.

Operating Principles

Vapor sample is periodically introduced into helium carrier gas stream which constantly flows through tubing containing a suitable partitioning agent. Using properly selected partitioning agents, sample is fractionated into pure compounds and carried along by helium stream. Concentration of each sample component is measured as it passes through thermal-conductivity detector at column outlet. Concentration data are presented in bar chart form by recorder.

Price under $5000

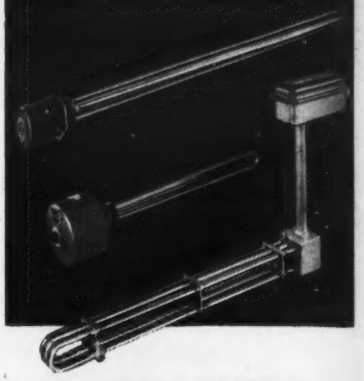
Priced under $5000, process gas analyzer records from one to four components directly. Concentration span for each component can be adjusted independently within a range of 100-to-1. Bar chart presentation will thus read directly in percent concentration for both major and minor components.

Corrosion-resistant model is available in which all materials contacting sample are either stainless steel or Teflon.

Power requirements are 115v AC, 400 watts (maximum). Helium is recommended as carrier gas.

(Process Vapor Fractometer is product of Perkin-Elmer Corporation, Dept. CP, Norwalk, Conn. . . or for more information check 5537 on form opposite last page.)

For clean, accurate, dependable heat
CONVERT TO
CHROMALOX ELECTRIC IMMERSION HEATERS



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- Portable, screw-plug, flanged types; full range of sizes and ratings
- "Packaged" units—heating element and thermostat in one
- Copper, steel, alloy or lead sheath
- Explosion and moisture-resistant terminal boxes available
- Most sizes ready NOW for immediate shipment

For these applications:

Heating water, oils, Dowtherm, Prestone, tars, greases • Plating, cleaning and pickling solutions • Heating tanks, drums, process kettles • Melting greases, asphalt, other viscous fluids • Super-heating steam, compressed air • Melting lead, solder, babbitt and stereotype metal.

FREE CATALOG

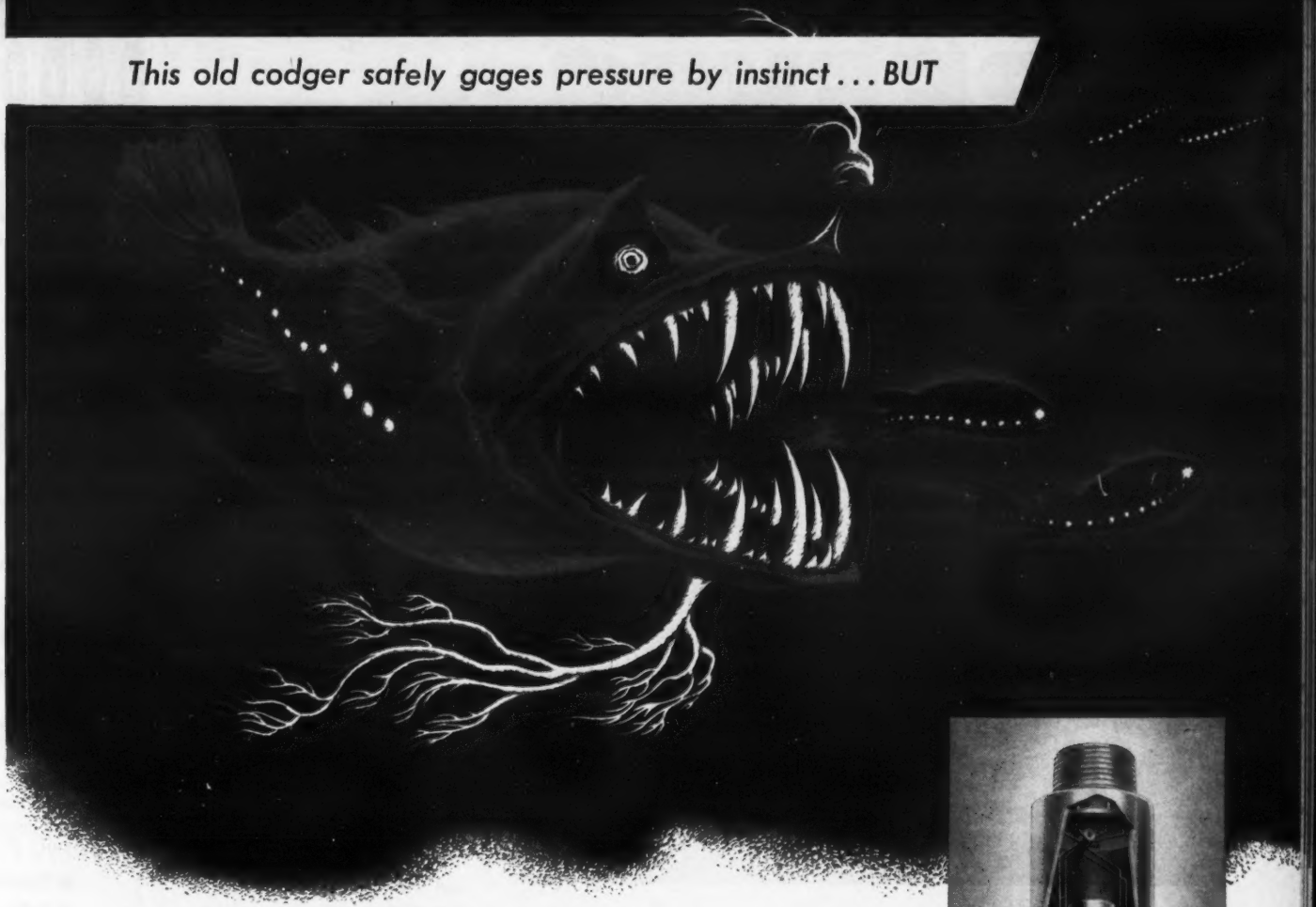
Write today for Catalog 50. Full details including prices for Chromalox Electric Immersion Heaters and other units that provide the electrical answer to many more heating problems.

C-2102A

Edwin L. Wiegand Company
7517 Thomas Boulevard
Pittsburgh 8, Pa.

When inquiring check 5538 opposite last page

This old codger safely gages pressure by instinct . . . BUT



You can rely on SR-4® Pressure Cells to measure and control all industrial pressures safely to within ±¼% accuracy

The life of this toothy specimen depends on his staying at extreme ocean depths under many tons of pressure. If he ventures up too high—blooey! Suddenly diminished pressure causes him to literally explode.

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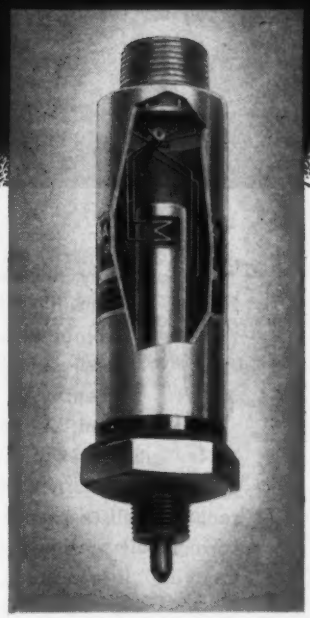
Whatever your pressure measurement problem, a B-L-H representative will be happy to help you, from selecting the proper transducer to engineering a complete pressure measuring system. Remember, a system is only as accurate as the transducer. Write today for your free copy of Bulletin 4306 on rugged, compact, reliable SR-4 Fluid Pressure Cells.



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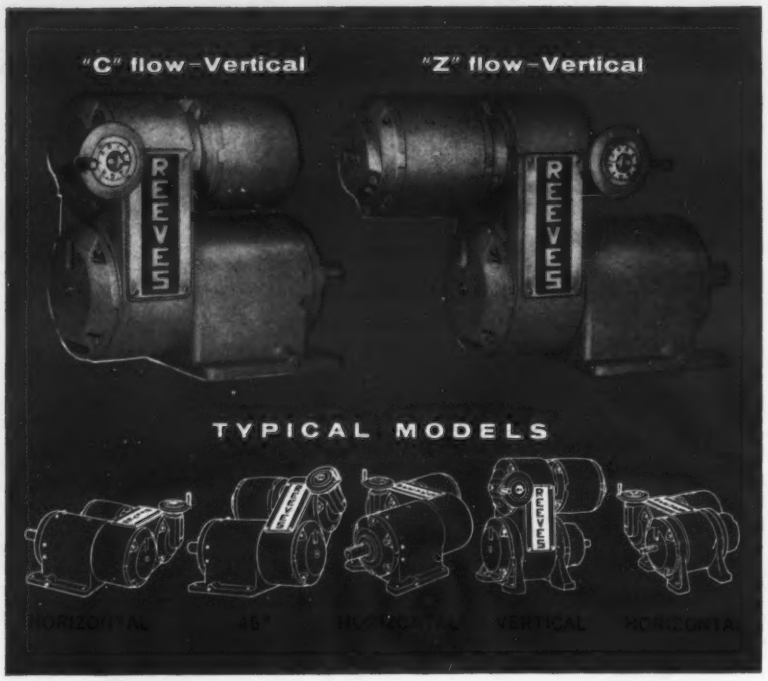

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INSTRUMENTATION

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Dynamic analysis is key to low-cost systems for process control

Technique cuts costs, also gives high performance

Recent technical paper outlines method for dynamic analysis of control systems for high performance with low cost.

Because system design and selection of control components have been on an empirical basis, comparisons of increased process controllability against cost of different systems have been difficult.

Using example of pressure and temperature control system with precise control limits, steps in analysis procedure are illustrated. Specifications required linear program of temperature and pressure of six-second duration to go from 35 to 175 psia and from 240° to 700°F, maintaining pressures within ±2 psi and temperatures ±14°F.

Steps in analysis were: representing process requirements and each control component by mathematical means; determining frequency response

Turn to page 90

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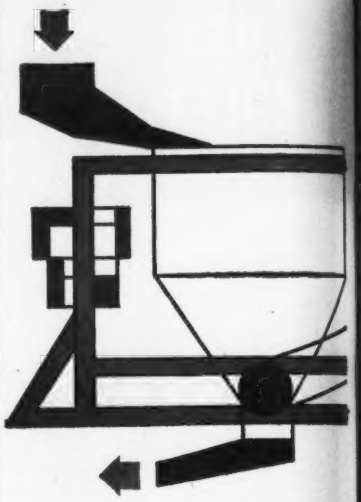

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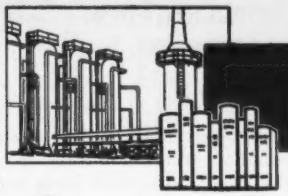


Correction Factors for Manometers with Sealing Liquids

J. G. LOWENSTEIN
Fairfield Chemical Division
Food Machinery and Chemical Corp.,
Baltimore, Md.

In fluid flow measurements it is often necessary to introduce a sealing liquid between the flowing liquid and mercury in the manometer, because of the undesirable effect the flowing liquid might have on the mercury. Such liquids as mineral oil, or even water, are commonly used as sealing liquids.

However, specific gravities of liquids employed are different, so a correction factor, f, must appear in the orifice equation:

$$W = fCd^2\sqrt{h} \qquad fC = C', \qquad W = C'd^2\sqrt{h}$$

Mathematically, the gravity correction factor can be expressed:

$$f = \sqrt{\frac{(1 - 0.0737\ Gs)\ Gf}{0.9263}}$$

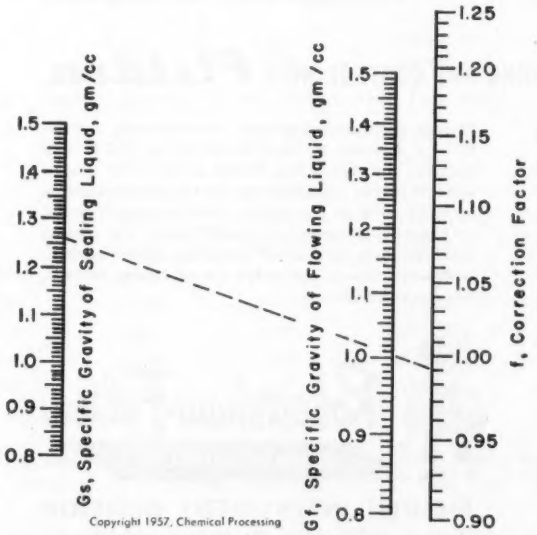
Accompanying nomograph solves for the correction factor, given the specific gravities of the flowing and sealing liquids, respectively. Since, for many computations, this equation is rather laborious, the nomograph saves considerable time, as the correction factor is a necessity for accurate determinations and measurements.

Typical Example

Flowing liquid in system is water (Sp g = 1.0), and the sealing liquid is glycerine (Sp g = 1.26). What is the necessary correction factor? Connect 1.26 on the G_s-scale with 1.0 on the G_f-scale, and read f = 0.99 where the extension of the line cuts through the f-scale. Solution of equation by mathematical means yields f-value of 0.9896. (NOTE: when both flowing and sealing liquids are water, correction factor equals unity.)

NOMENCLATURE:

- C,C′ = constants in orifice equation
- d = diameter of orifice, inches
- f = specific gravity correction factor
- G_f = specific gravity of flowing liquid, gms/cc
- G_s = specific gravity of sealing liquid, gms/cc
- h = reading of differential mercury manometer, inches of H_2O
- W = rate of flow of liquid (units depend on units of C or C′)



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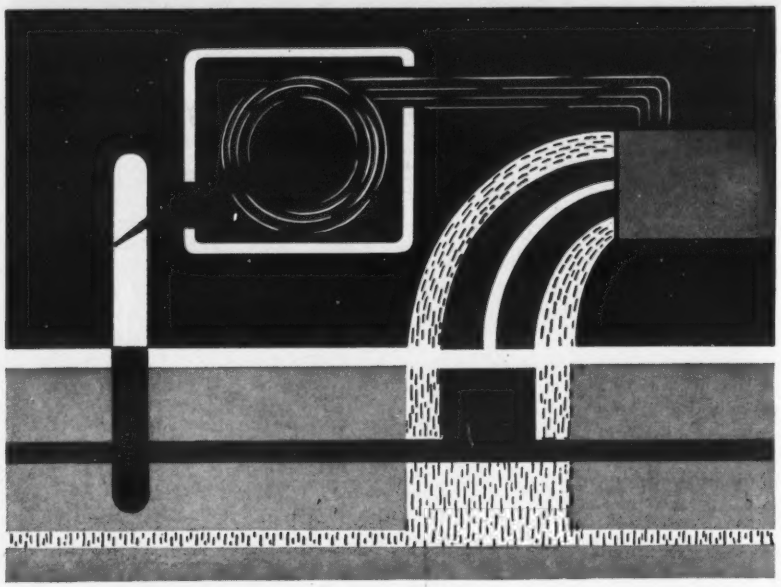
PNEUTRONIC *Level Control Provides Proportioning Action at Low Cost*



The new Fielden Pneutronic Level Control proportions flow and maintains level simply by combining an electronic "dip stick" with a proportioning pneutronic control. This dip stick has no moving parts, yet actually "senses" change in level and integrates the electronic and pneutronic units into a simple, dependable null-balance system.

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When inquiring check 5544 opposite last page

INSTRUMENTATION

Starts on page 88

of process and control components and combining in a Bode plot; analyzing Bode plot to determine system material frequency, including optimum settings of controller; analyzing requirements for small errors because of flow upsets; simulating control system on analog computer, including all actuator, valve, and process non-linearities.

Final determination includes developing set of component specifications for required performance, using low cost hardware.

Wherever possible, process requirements are modified to reduce cost of control system. However, modifications are only made after their effects are calculated and understood.

(Material was taken from technical paper by Abraham Fuchs, Analytical Dept., CDC Control Services, Inc., Dept. CP, Hatboro, Pa. . . . or for more information check 5545 on form opposite last page.)

Boosts ammonia yield at Atlantic Refining synthetic plant

Gas concentration analyzer holds precise H_2-N_2 ratio

At The Atlantic Refining Company's synthetic ammonia plant in Philadelphia, Pa., thermal conductivity analyzers and electronic recorders are used to maintain a high yield. Precise ratio of hydrogen-nitrogen is essential for process economy.

Hydrogen-nitrogen ratio is

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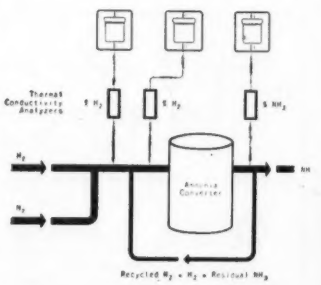

Diagram of gas analyzer installation at Atlantic Refining

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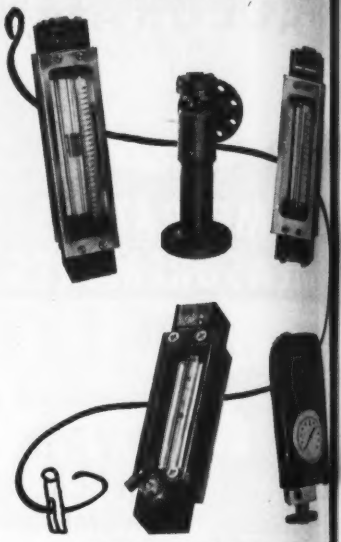

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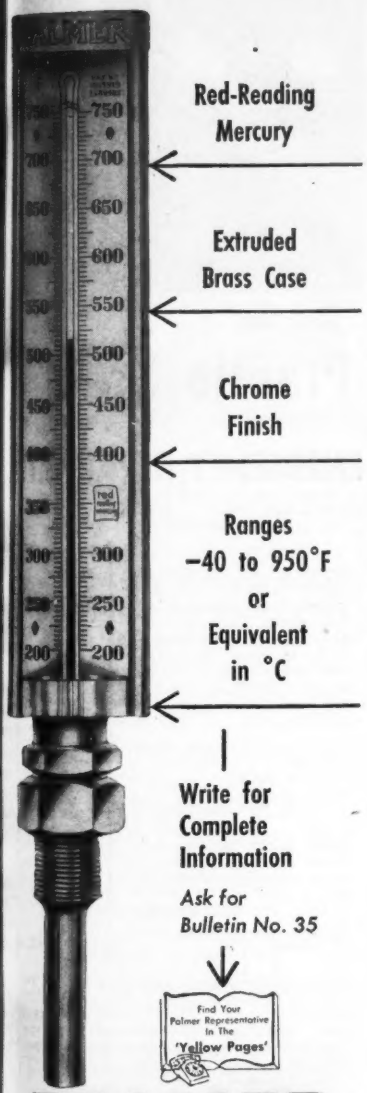

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Liquid Propane and Butane Flow Calculations

G. W. EDWARDS and G. L. PRATT,
American Oil Company,
Texas City, Texas

In calculating liquid flows from orifice meter data, reciprocal and square root functions of specific gravities are used. Tables listing these functions for use in calculating liquid propane and butane flows at base temperature of 60°F have been prepared. Ranges of specific gravity at 60°F from 0.485 for each 0.001 through 0.600 and observed flow temperatures for each degree from 40° through 120°F are included. Figure 1 represents a sample of the 40 pages of tables prepared by the authors.

Liquid specific gravity functions were calculated from data[1]. Additional data needed for calculating flow are: (1) observed temperature, (2) observed specific gravity converted to base temperature of 60°F, (3) chart reading, and (4) meter factor.

For a certain propane meter, the factor is based on a flowing temperature of 60°F and a specific gravity of 1.000. Thus, corrections must be made for flowing temperatures other than 60°F and specific gravities different from 1.000. The tables facilitate these corrections.

Typical Example

Averaging the propane flowmeter reading from 0 to 10 on a square root scale each hour and then adding for a 24-hr period, we obtain a chart total reading of 126.4. Average temperature for the flowing propane is 86°F. Average specific gravity at 60°F is 0.506. Meter factor is 398.5 giving gallons per hour. From Fig. 1, reciprocal of specific gravity (0.506) is 1.9763. At 86°F and under 0.506 specific gravity at 60°F column, square root function is 0.695521.

Calculation is as follows:

Chart total for 24 hr × meter factor × reciprocal of specific gravity at 60°F × square root of specific gravity at flowing temperature = gal liquid per day at 60°F.

126.4 × 398.5 × 1.976 × 6955 = 69,224 gal/day

LITERATURE REFERENCE

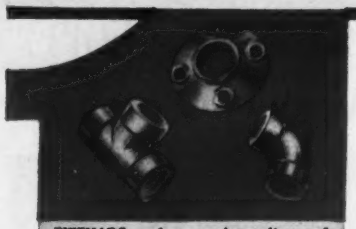
1) "Reduction of Observed Specific Gravity to Specific Gravity 60/60°F," Table 23, p 177, ASTM-IP Petroleum Measurement Tables, American Edition, Second Printing, July, 1954

Figure 1

Specific Gravity at 60°F and Reciprocal

Observed Temperature, °F	0.503 1.9881	0.504 1.9841	0.505 1.9802	0.506 1.9763	0.507 1.9724	0.508 1.9685
	Square Root of Specific Gravity at Observed Temperature					
81	.696420	.697137	.697854	.698570	.699285	.700000
82	.695521	.696420	.697137	.697854	.698570	.699285
83	.694622	.695521	.696420	.697137	.697854	.698570
84	.694262	.694982	.695701	.696420	.697316	.698212
85	.693542	.694262	.694982	.695701	.696420	.697316
86	.692821	.693722	.694622	**.695521**	.696420	.697137
87	.692098	.692821	.693722	.694622	.695521	.696420
88	.691918	.692821	.693542	.694262	.694982	.695701
89	.691014	.691918	.692821	.693542	.694262	.694982
90	.690109	.691014	.691918	.692821	.693542	.694262

(Copies of complete set of tables is available on letterhead request from G. W. Edwards and G. L. Pratt, American Oil Co., Texas City, Tex.)



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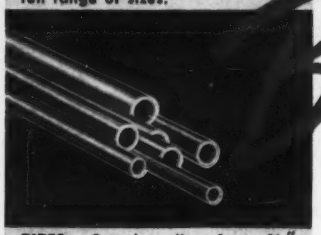

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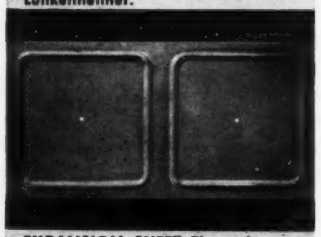

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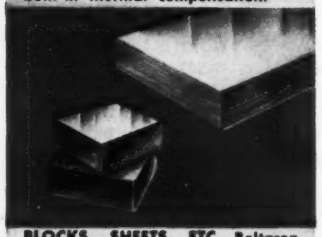

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Starts on page 90

so important at Atlantic that two identical analyzers are used on feed stream, one before and one after entry of recycle gas. Percentage of hydrogen, in range of 65 to 85%, is continuously measured by the two analyzers. A third analyzer, calibrated from 0 to 20% NH_3, measures ammonia yield from the converter and amount returned in recycled gas stream.

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Any change in gas composition results in unbalance of bridge. Electronic recorder detects unbalance and repositions slidewire contact to restore balance. Gas concentration is also recorded.

(Gas conductivity analyzers and recorders are product of Leeds & Northrup Co., Dept. CP, 444 N. 16th St., Philadelphia 30, Pa. . . . or for more information check 5549 on form opposite last page.)

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212

Flow of Water in Horizontal Pipes

RAYMOND M. GLUECK
General Aniline & Film Corp.,
Linden, N.J.

For flow of water in horizontal pipes between one and six inches in diameter when the depth is between 0.2 and 0.6 of the inner diameter, this nomograph is based on the equation[1]

$$q = 7.3\, d^{2.56} K^{1.84}$$

where

q = rate of flow of water, gallons per minute
d = internal diameter of pipe, inches
K = decimal fraction of vertical diameter under water.

In contrast to an earlier chart[2] for the same equation, this one carries a scale for internal diameters instead of one for nominal pipe sizes.

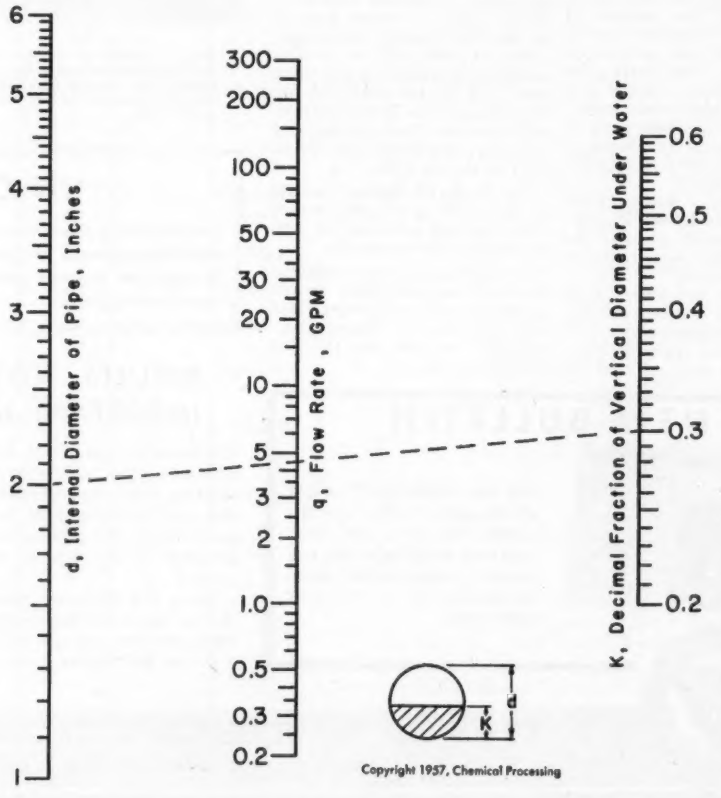
TYPICAL EXAMPLE

What is the rate of flow of water in a pipe with an internal diameter of 2 in, running 0.3 full? Straight line connecting 2 on the d-scale with 0.3 on the K-scale intersects the q-scale at a flow of 4.7 gpm.

LITERATURE CITED

1) Brooke, M., *Chem. Eng.*, 64 (3) 294 (1957) quoting Greve, Bull. Purdue Univ., 12, No 5 (1928), Bull. 32

2) Davis, D.S., *Ind. Eng. Chem.*, 34, 52 (1942); "Chemical Engineering Nomographs," p 58, McGraw-Hill Book Co., Inc., New York, 1944



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Emery WEIGHING SYSTEM NEWS

BIN, TANK AND HOPPER EDITION No. 6

Covering design, development and application data on Emery Weighing Systems for industrial applications

HOOKER ELECTROCHEMICAL COMPANY USES EMERY LOAD CELLS TO GET ACCURATE MEASUREMENT AND INDICATION OF FLUID IN TANKS

EMERY CELLS WERE SELECTED BECAUSE THEY WERE CONSIDERED MORE ACCURATE THAN LEVEL INDICATORS OR PLATFORM SCALES

GEORGE C. DUCKWALL
Plant Engineer

The Montague, Michigan, plant of Hooker Electrochemical Company was designed to tap the inexhaustible supply of subterranean salt in the area, and using an electrolytic process, turn it into caustic soda, chlorine and hydrogen. Total construction costs of the Hooker plant in Montague have been estimated at approximately $18 million.

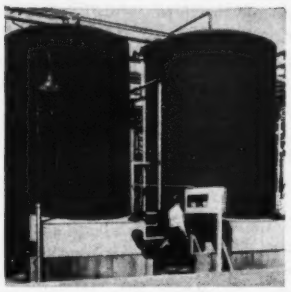
In equipping a modern plant such as this new Hooker installation, much care is given to the selection of every piece of industrial apparatus used.

Referring to the Emery Cells in use in tank weighing installations at the Montague plant, G. E. Duckwall, plant engineer, says, "Emery Cells were selected because they gave a more accurate measurement of the amount of fluid in the tanks than either level indicators or platform scales."

Five of the tanks in the Hooker installation stand on end and are supported at the tank bottom by Emery Cells. A sixth tank is mounted horizontally and is supported at both ends. To do this weighing job, Hooker is now using four Type EC-100 Cells and two Type EC-60 Cells. The only instrumentation involved are the dial indicators connected directly to each of the six cells.

Mr. Duckwall reports, "to date we have had good performance from the load cells and no malfunctions of the apparatus."

If you have a tank weighing problem, we will gladly recommend the type of Emery Load Cell and the instrumentation necessary to give you the best possible results.



Worker reads on Emery Dial Indicators the weight of the contents of two vertical tanks. Each tank is supported by one Emery Load Cell.

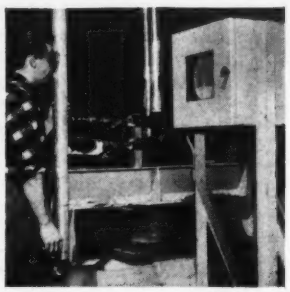
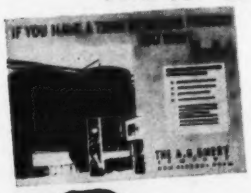


Photo shows how Emery Load Cell supports frame which carries weight of tank. Indicator can be set to eliminate tare weight of tank and structure.

NOTICE

Our Engineering Department will gladly supervise a survey of your tank weighing needs. Just give us the opportunity of discussing your problem with you and you will find our representative at your service immediately.

NEW BULLETIN



Our new Bulletin 571 is just off the press! It discusses the results that you want from your tank weighing system and how to go about getting them. Be sure to send for your copy right away.

RESULTS, NOT MECHANICS, ARE IMPORTANT IN TANK WEIGHING

Engineers at The A. H. Emery Company have re-directed their thinking concerning problems in the tank weighing field to the point where the problem is approached in the light of *results wanted*.

Using this necessary result as the starting point, these engineers learn whether a simple dial-indicated result is wanted . . . whether a printed tape or special printed ticket will serve the purpose better . . . whether some other type of recording would be preferable . . . or whether a control function is needed.

The weighing equipment is then designed to produce the required result. May we talk about the *results* you want from your weighing system?

PRECISION SINCE 1872 — THE A. H. EMERY CO. — FORCE MEASUREMENT

THE A. H. EMERY COMPANY
Pine Street • New Canaan, Conn.

When inquiring check 5551 opposite last page

INSTRUMENTATION

Telemetering systems

Temperature recording by telemetering, remote control of valves and pumps, and serial or parallel entry data printers are covered in 28-page bulletin on company's telemetering system equipment. Bul. CP-3012 — The Vapor Recovery Systems Co., Dept. CP, 2820 N. Alameda St., Compton, Calif. Check 5552.

Ultrasonic level sensor instantaneously responds

Probe is completely sealed in stainless steel

Uses: As liquid level sensor for many liquids at temperatures from −270°F to 220°F where light weight is required with critical control.

Features: Ultrasonic sensor is completely sealed in stainless steel. Operation is not dependent on either conductivity, pH, temperature, pressure, or density of liquid being monitored. Sensor will operate despite conditions of foam and clinging droplets.

Description: Developed for critical applications in airborne gaging, ultrasonic liquid level sensor has been adapted for AC operation with auxiliary rectifier. Sensor element consists of a solid cylinder of barium titanate bonded axially to a slug of stainless steel. Overall length of probe is about 2½ inches. Weight is

Turn to page 96

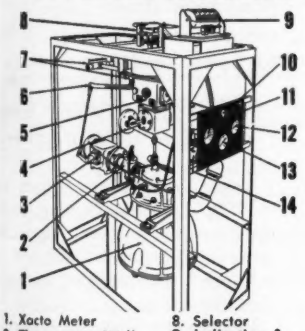
Complete ultrasonic liquid level sensor weighs 12 ounces. Probe is encased in stainless steel

Blends many liquids automatically with unexcelled accuracy

Bowser precision proportioners automatically and accurately blend two or more liquids in closed, continuous production.

A simple setting of the percentage selectors provides any variation of blend from ½% to 100%. XACTO, "the world's most widely used meter," assures perfect proportioning of all liquids being mixed, compounded or blended.

SIMPLICITY OF DESIGN SAVES SPACE . . . REDUCES MAINTENANCE



1. Xacto Meter
2. Thermometer Well
3. Inlet Control Valve
4. Differential
5. Control Nut
6. Valve Control Arm
7. Pump Control Circuit & Switch
8. Selector
9. Indicating & Totalizing Dial
10. Flow Indicator
11. Inlet Pressure Gauge
12. Discharge Pressure Gauge
13. Dial Thermometer
14. Discharge Check Valve

DIALS FOR EVERY PURPOSE

Model K — furnishes printed record of quantity dispensed or received for accounting; Model P—delivers predetermined quantities up to 10,000 gallons; Model RP — delivers predetermined quantities, repeating each quantity automatically.

FREE OFFER . . .

Write for full color, 12-page Facts Folder titled, "XACTO PRECISION BLENDING SYSTEM."

BOWSER INC.
1315 E. CREIGHTON AVE.
FORT WAYNE, INDIANA

When inquiring check 5553 opposite last page

Pitot Tube Nomograph for Air

CLIFFORD L. DUCKWORTH
803 Amherst Drive
East Alton, Illinois

This nomograph is intended for use with standard pitot tubes [1,2] when measuring flow rate of air. The equation[3] upon which the chart is based is

$$V = 1096.5\left(\frac{H}{\rho}\right)^{0.5}$$

where

V = velocity of air, ft/min

H = velocity pressure (pitot tube manometer reading), inches of H_2O

ρ = density of air, lb/cu ft

Nomograph was constructed in accordance with well-known methods[4].

Connect the manometer reading on the H-scale with the density of the air on the ρ-scale and read the velocity of the air on the V-scale. **NOTE:** The H-and V-axes are numbered on both sides to expand the scales without loss of accuracy. Thus a point on the H-scale may, for instance, represent either 0.05 on the left or 5 on the right; for a specific value of ρ, the corresponding resultant on the V-scale will be on the same side of the V-axis.

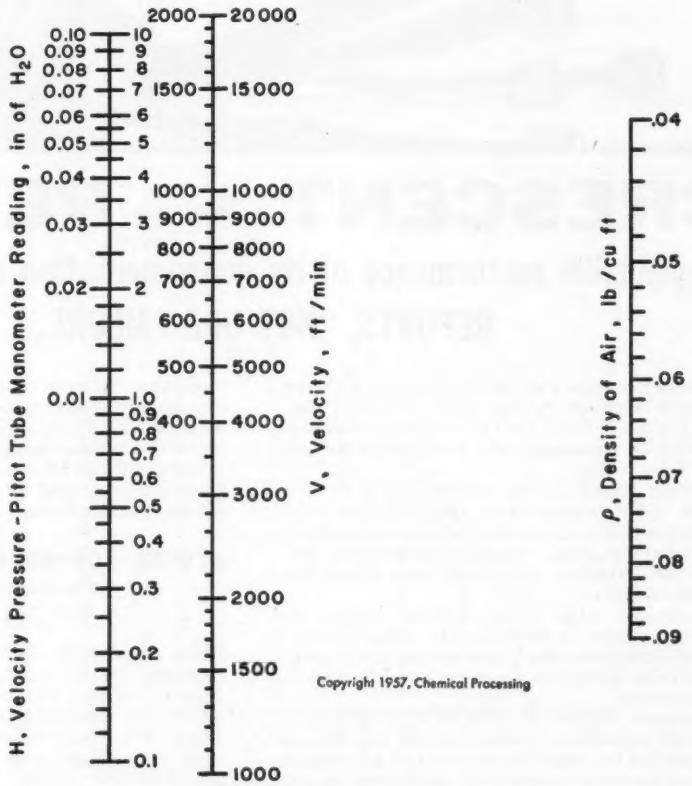
LITERATURE CITED

1) "Standard Test Code for Centrifugal and Axial Fans," American Society of Heating and Ventilating Engineers, and National Association of Fan Manufacturers, 1938; Bulletin No. 110, N.A.F.M.

2) "Heating, Ventilating, Air-Conditioning Guide," p 1151, American Society of Heating and Air-Conditioning Engineers, 1956

3) Ibid, p 1152

4) Perry, J. H., editor, "Chemical Engineers' Handbook," 3rd ed, p 100, McGraw-Hill Book Co., Inc., New York, 1950



Copyright 1957, Chemical Processing

Starts on page 94

less than 5 ounces.

Probe has been operated with liquids ranging from liquid nitrogen to boiling water. For higher temperature operation, a small magnetostriction transducer is used in place of the titanate.

Complete level sensor, including transistorized electronic control unit, weighs under 12 ounces and requires only 20 milliwatts in operation. Instrument will energize a relay when a liquid level passes a preset height with accuracy of ±1/32 inch. Operation is on 115v AC, 60 cps.

(Model RC-1 ultrasonic level sensor is product of Acoustica Associates, Inc., Dept. CP, Shore Road, Glenwood Landing, L. I., N.Y. . . . or check 5555 opposite last page.)

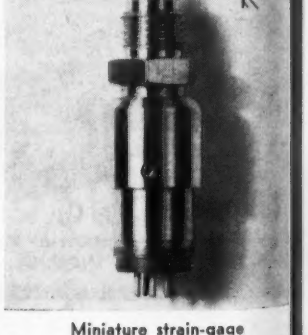
Miniature strain gage measures forces to 2000 pounds

Will handle sudden forces applied to rigid structures

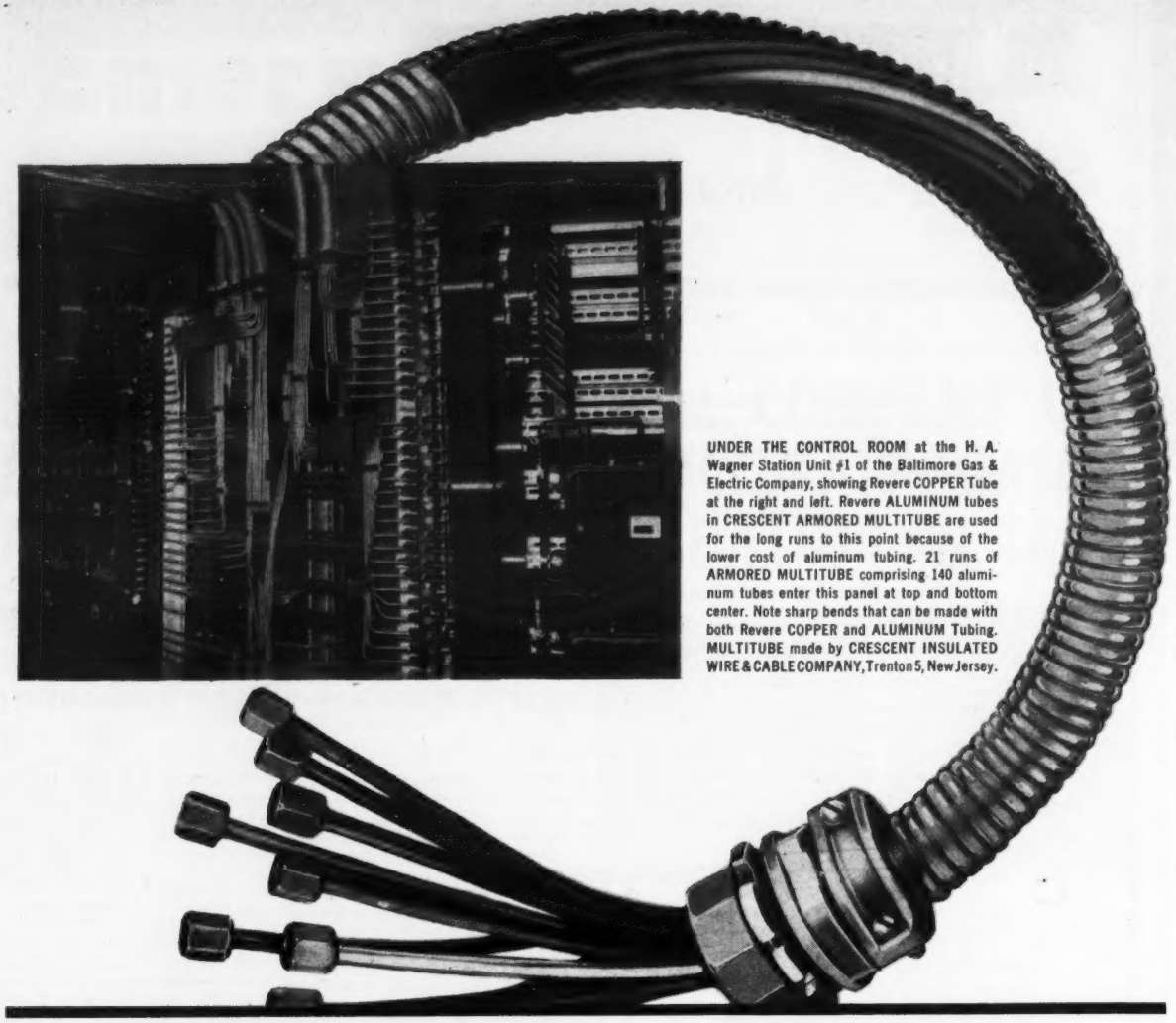
Uses: Measuring forces up to 2000 pounds, either compression or tension. Applications include measurement of sudden forces applied to rigid structures.

Features: Miniature strain gage will measure even smallest deflection as total excursion is only 0.00035 inches.

Turn to page 98



Miniature strain-gage



UNDER THE CONTROL ROOM at the H. A. Wagner Station Unit #1 of the Baltimore Gas & Electric Company, showing Revere COPPER Tube at the right and left. Revere ALUMINUM tubes in CRESCENT ARMORED MULTITUBE are used for the long runs to this point because of the lower cost of aluminum tubing. 21 runs of ARMORED MULTITUBE comprising 140 aluminum tubes enter this panel at top and bottom center. Note sharp bends that can be made with both Revere COPPER and ALUMINUM Tubing. MULTITUBE made by CRESCENT INSULATED WIRE & CABLE COMPANY, Trenton 5, New Jersey.

CRESCENT relies on REVERE

for dependable performance of its instrumentation and control tubing

REPORTS, "NOT ONE FAILURE."

The dependable performance of Revere Copper Tube in Crescent Armored Multitube*, ever since its inception, has led the CRESCENT INSULATED WIRE & CABLE COMPANY to fill its aluminum tube needs with Revere also.

In fact, Crescent, since it first started using Revere Copper Tube in 1953, reports not a single failure. And that's mighty important in instrumentation and control tubing service where utilities, chemical processing, petroleum, paper and similar industries can't afford the luxury of process failures.

Crescent Multitube, using either Revere Copper or Aluminum Tube, or both in combination, offers a completely protected installation for permanence, lower original installation cost, lower maintenance and a saving of time, space and money.

Crescent Armored Multitube consists of a group of Revere Copper or Aluminum Tubes, twisted together in cable form, protected by a flexible interlocked galvanized steel armor. Constructions are available employing plastic sheaths in combination with the armor for corrosive locations. Section of cabled tube pictured shows how Copper or Aluminum Tubes are encased inside the Armored Multitube. As many as 37 tubes of ¼" OD can be cabled in lengths up to 1,000 ft.

For details on Multitube write Crescent and for uniform quality copper and aluminum tube, speedily delivered, see the nearest Revere Sales Office. *Reg. Trademark

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

When inquiring check 5554 opposite last page

for RELIABLE MONITORING in Hazardous Locations...

SCAM EXPLOSION-PROOF ANNUNCIATORS (Type EKP-4)

Wherever processes or systems in hazardous locations must be monitored with unwavering safety, consider Scam Explosion-Proof Annunciators. These rugged alarms provide a sturdy housing that is approved for Class I, Division I, Group D locations.

INCLUDES ALL THESE SCAM FEATURES:

- Four alarms in one housing...requires little piping, low installation costs!
- Standard for "Sequence A" (visual-audible), other sequences on special order!
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- Only four holes required for easy panel mounting!

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For special Explosion Proof Systems, consult with us or one of our representatives.

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When inquiring check 5556 opposite last page

Chart to Raise Numbers to Fractional Powers

J. G. LOWENSTEIN
Fairfield Chemical Division
Food Machinery and Chemical Corp.
Baltimore 3, Md.

Chart solves the equation:

$f(n) = n^x$

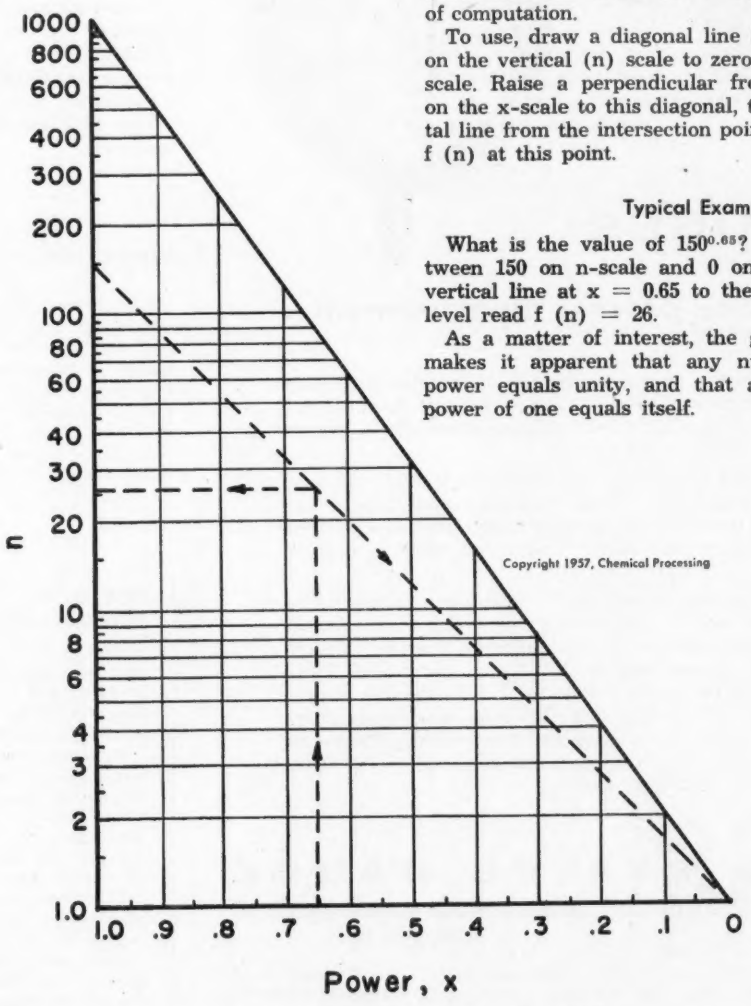
for positive powers between 0 and 1.0, and, as presented, for base numbers from 1 to 1000. The graph can be extended to include larger numbers. Chart is sufficiently accurate for most calculations and eliminates need for slide-rule or log tables for this type of computation.

To use, draw a diagonal line from the base number on the vertical (n) scale to zero on the horizontal (x) scale. Raise a perpendicular from the desired power on the x-scale to this diagonal, then extend a horizontal line from the intersection point to the n-scale. Read f (n) at this point.

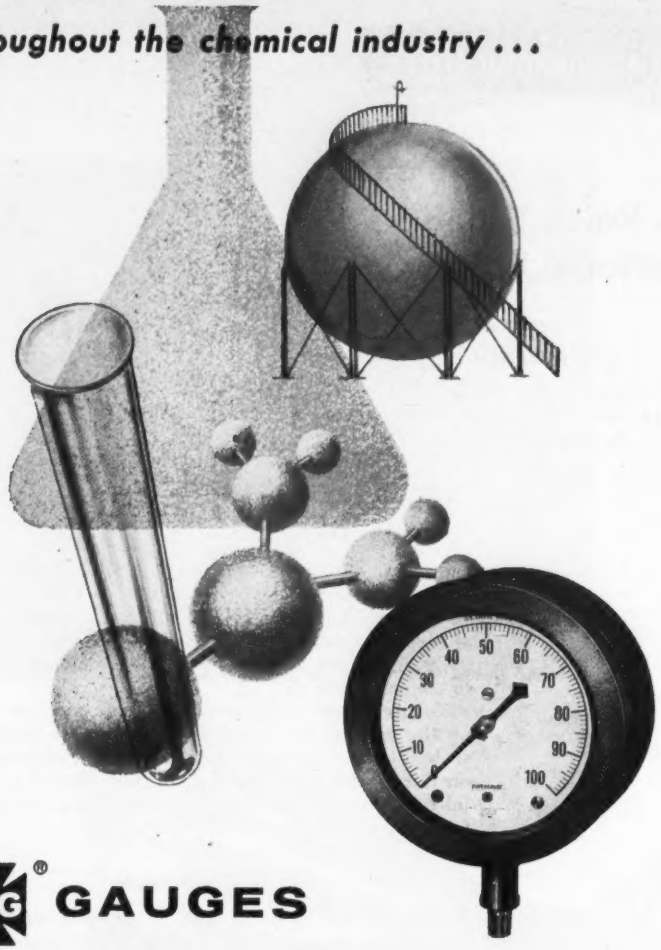
Typical Example

What is the value of $150^{0.65}$? Draw a diagonal between 150 on n-scale and 0 on the x-scale. Draw a vertical line at $x = 0.65$ to the diagonal, and at that level read $f(n) = 26$.

As a matter of interest, the geometry of the chart makes it apparent that any number raised to zero power equals unity, and that any number raised to power of one equals itself.



Throughout the chemical industry . . .



USG® GAUGES

assure precise process measurement

Higher accuracy . . . longer service life . . . greater resistance to pulsation, corrosion—these ever increasing demands by the chemical industry have led to higher standards in instrument design and manufacture.

USG's Research Laboratory has done and is doing much to further these standards. Gauge materials and designs are under constant test. Extreme process conditions are simulated to assure accuracy and safety under the worst operating conditions.

These tests annually save USG customers hundreds of thousands of dollars through *precise* measurement, less downtime and less frequent gauge replacements. See the "Yellow Pages" of your phone book to find the name of your USG Distributor. Get complete details on USG's famous Supergauge®, the Solfrunt® (Solid Front) Gauge for maximum safety, the Diaphragm Receiver Gauge and the Pressure Pilot—all designed to give the optimum in process efficiency . . . or write to the factory for catalogs of each.

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Division of American Machine and Metals, Inc.
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MORE THAN 50,000 TYPES OF GAUGES • SUPERGAUGES • SOLID FRONT GAUGES • RECEIVER GAUGES • TEST GAUGES • RECORDERS • CONTROLLERS • TRANSMITTERS • PSYCHROMETERS • AVIATION INSTRUMENTS

When inquiring check 5557 opposite last page

INSTRUMENTATION

Description: Complete instrument consists of a force probe, an unbonded strain gage, and an electrical strain-gage connector built into a small cylinder. Pickup is mounted so force probe is in direct contact with object studied. Excitation voltage is applied to strain gage. When force is absorbed by object, thrust is transmitted to strain-gage element, varying its electrical output.

Output signal is 3.33 millivolts per excitation volt. Safety coupler can protect unit from severe overloads. Excitation may be 6, 12, or 15 volts, AC or DC. Linearity is within 0.5% of full scale. Temperature range is −65° to 350°F. Units are constructed of stainless steel and weigh two ounces.

(Force pickups are product of Dynamic Instrument Company, Inc., Dept. CP, 28 Carleton Street, Cambridge, Mass. . . . or for more information check 5558 on form opposite last page.)

Viscometers

Viscosity control system for automatic addition of solvent to correct for evaporation losses is described and illustrated in two-page bulletin. Bul V-1212 — Norcross Corporation, Dept. CP, 247 Newtonville Ave., Newton 58, Mass. Check 5559.

FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service slip opposite last page of this issue. Fill in slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

Faster, easier, better

HEAT

CONTROL

AGITATION

at the Turn of a Dial

Dimensions: 8½" h., 18½" w., 14½" d.

FISHER OSCILLATING HOT PLATE

The Fisher Oscillating Hot Plate assures rapid and complete mixing, dissolving, precipitation or evaporation without spattering at a constant 216 rpm, with or without heat. 2000 watt cast-in-aluminum heating element, operating at 200° F to 700° F surface temperatures, gives faster, more uniform heat distribution. Stepless control allows operator to dial and duplicate the exact heat every time, all the time, for maximum effectiveness with minimum attention. Heater and oscillator operate independently or together.

Send for details

The new Fisher Catalog Supplement, page 53, gives specifications on the Fisher Oscillating Hot Plate. Send for your copy.

103 Fisher Building, Pittsburgh 19, Pa.

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America's Largest Manufacturer-Distributor of Laboratory Appliances & Reagent Chemicals

B-1-A

When inquiring check 5560 opposite last page

chemical business

Chicago Daily Tribune
THE WORLD'S GREATEST NEWSPAPER
TUESDAY, JUNE 4, 1957
PRICE—FIVE CENTS
52 PAGES CITY HOME

DU PONT'S G.M. HOLDING

City, Suburb Vote Light

oices Appeal
G.O.P. Unity

COURT UPSETS LA BUY RULING IN TRUST SUIT

4-2 Split Finds Law Violated

Ike Calls for More Cash to Operate P.O.

SEE TURNOUT OF 21% HERE, 9.5 IN COUNTY

Bonds Not Hiking Judicial Interest

ADDING INSULT TO INJURY

upshot...FTC Hits Carbide Merger

WHITE HOUSE ANNEX MAPPED

N.U. Scientist Receives Top A. M. A. Award

page 101

BLAZING GAS SPRAYS TRAIN AFTER CRASH WITH TRUCK; 1 DEAD

JOHN L. LEWIS GETS DOCTOR OF LAW DEGREE

BRUCKER RIPS PROPOSED CUTS IN ARMY FUNDS

EXPLORE THE HYDROXYLAMINES!

Unique reactivity characteristics excite industry
New applications discovered daily

Hydroxylamine salts have reactivity characteristics possessed by no other chemical. Already being put to work in a wide range of uses, these versatile nitroparaffin derivatives offer exciting potential to all chemical explorers.

FOR SYNTHESIS For making oximes, hydroxamic acids and numerous intermediates, for preparation of anti-skinning agents, anti-rusting agents and pharmaceuticals.

AS ACID-STABLE REDUCING AGENTS For metallic ions such as ferric, cupric, silver and for nonmetallics such as dyes, peroxides and nitrates. For purification processes, dyeing of acrylic fibers and as a short-stopper for catalyzed polymerization reactions.

FOR OXIDIZING The hydroxylamines are probably mild oxidizing agents in alkaline solutions. Further explorations called for.

EFFECTS ON PROTEINS AND BIOLOGICAL SYSTEMS For inhibiting enzymes such as catalase, for hardening gelatine. Derivatives are good fungicides and bactericides. This is a relatively unknown "land" ideal for pioneering.

NOW AVAILABLE IN COMMERCIAL QUANTITIES Now available in quantity at moderate prices. Explore the hydroxylamine salts. For samples and complete technical data, fill out coupon and mail today.

DISCOVER THE NITROPARAFFINS!

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260 MADISON AVENUE, NEW YORK 16, N. Y.

Please send me: ☐ Technical data on the Hydroxylamines ☐ Sample of Hydroxylammonium Sulfate ☐ Sample of Hydroxylammonium Chloride ☐ Sample of Hydroxylammonium Acid Sulfate

NAME..... TITLE.....

COMPANY.....

STREET.....

CITY..... ZONE..... STATE.....

When inquiring check 5561 opposite last page

SEPTEMBER 1957

Vol. V No. 9

Highlights

Puerto Rico's "operation bootstrap" has record year; Island's petrochemical industry of growing importance to US chemical makers

page 104

Many chemical producers report record sales levels for 1957's first half; but profit margins for growing segment of the industry continues to shrink

page 103

American Gilsonite's gasoline-from-ore plant goes on stream. Operation is geared to produce 24,600 gallons of gasoline daily from solid hydrocarbon

page 106

Market analyst William R. White of Hornblower and Weeks looks at chemical companies. This month: Hercules Powder

page 108

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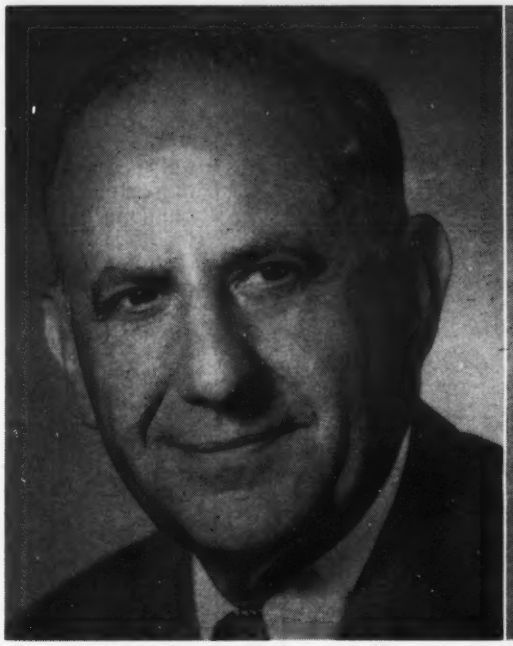
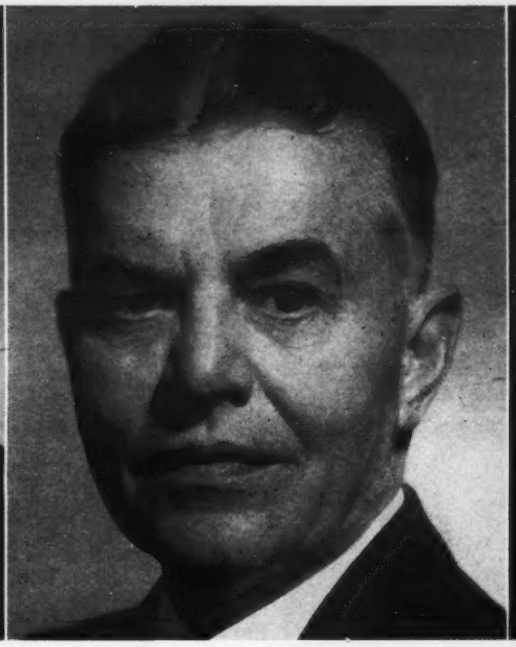
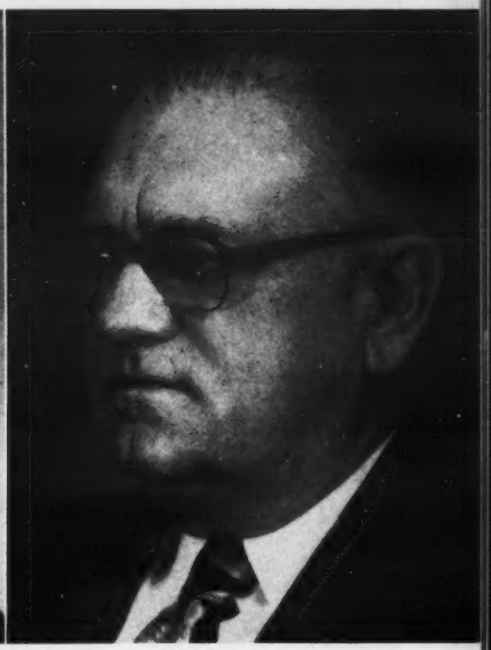


Visking President, Howard Medici



Carbide's Dial: "A thorough Study was made . . . "



FTC Chairman John Gwynne

In the first of possibly many anti-merger actions by the Government based on the recent Supreme Court finding in the Du Pont case, the FTC complaint against Union Carbide is . . .

Another Blow To Vertical Mergers

The chemical industry, probably having more than its share of mergers recently, is also taking its share of lumps from the Government's merger police.

Close on the heels of the Justice Department's victory over Du Pont, the Federal Trade Commission hit Union Carbide in an action to dissolve its corporate wedding to Visking Corporation, largest US polyethylene film maker.

This is the first FTC move against "forward-vertical" mergers, and the first major antitrust action filed since the Du Pont/General Motors finding brought about a new interpretation of the Clayton Act.

Here's the new interpretation the Supreme Court placed on the Clayton Act and how it relates to the FTC action against Carbide:

In the words of the Court's finding in the Du Pont case . . . "Up to now, Section 7 of the Clayton Act has been construed to apply only to acquisition of a competitor's stock, not to acquisition of a customer's stock by a supplier — in other words, horizontal, not vertical acquisitions . . . However, in amending the act in 1950, Congress made it clear that the law applies to all kinds of mergers and acquisitions."

The significance of this is also clear: The Government now has in its hands a weapon against any merger where, in its opinion, "restraint of commerce or creation of a monopoly is a likely result."

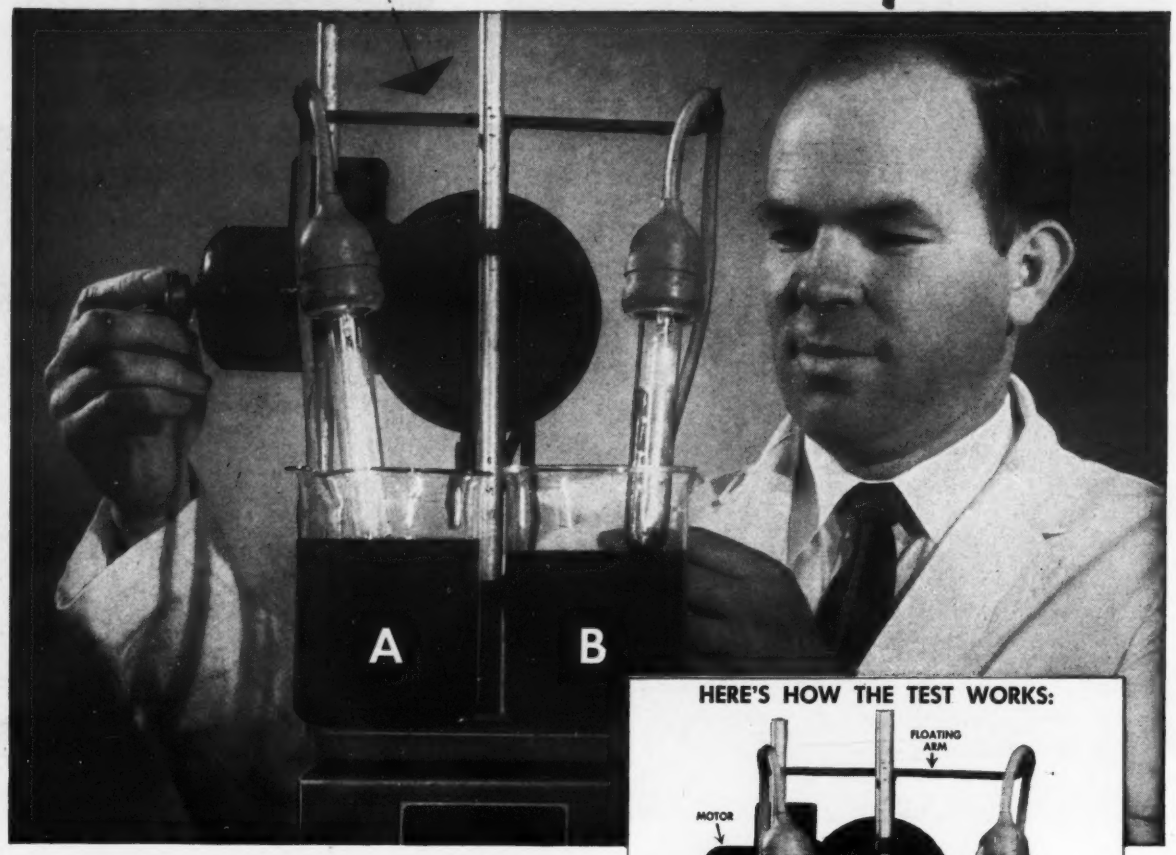
And this is the basis of the FTC action against Carbide. No charge is made of any conspiracy. The complaint states simply that "The effect of the aforesaid acquisition of Visking by Union Carbide may be substantially to lessen competition or to tend to create a monopoly in the manufacture, sale and distribution of polyethylene resin, film, and synthetic sausage casings in the United States within the meaning of Section 7 of the Clayton Act."

(However, the complaint does allege a violation of the Clayton Act's Section II, the price discrimination clause. It states that Carbide and Visking entered into a discount arrangement,

Turn to next page

BEFORE YOU SWITCH TO A RED OIL SUBSTITUTE:

Make this simple test

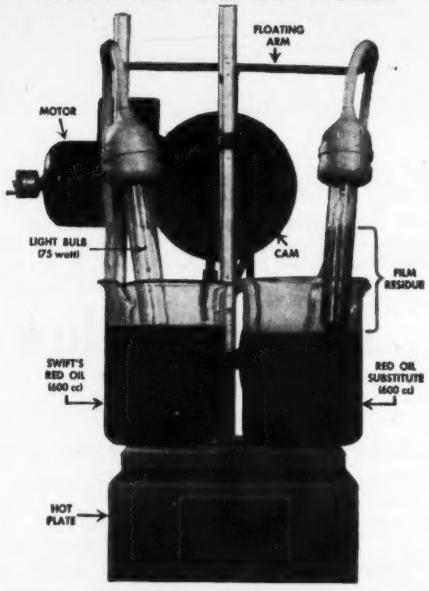


LIGHT BULB TEST
proves the superiority of Red Oil!

Some red oil substitutes contain a higher percentage of polyunsaturates than found in red oil. In the presence of heat these materials tend to solidify . . . to form a gum residue. This characteristic may be desirable *if* you want a *drying oil*. But, if you have purchased a red oil substitute for reasons of economy, for an application where oxidation or polymerization is an undesirable factor, your economy may well be a compromise with the quality of your product.

A simple test, as shown above and explained at right, will show, by sight, whether or not the product you are now using leaves a gum deposit in the presence of heat. Place *any* red oil substitute in beaker "B" *but reserve the other* . . . for SWIFT'S Red Oil. Write for a trial order today and remember . . .

HERE'S HOW THE TEST WORKS:



Apparatus is arranged to subject lighted bulbs to continuous immersion and withdrawal from beakers over a period of several days. Hot plate should be set to maintain temperature of oil at about 250° F. Results of test will be visible. Oil which contains polyunsaturates will be revealed by build-up of film on the surface of the light bulb.

ONE TRIAL IS BETTER
THAN A THOUSAND CLAIMS

SWIFT & COMPANY
Technical Products Dept.
1830 165th St., Hammond, Ind.

Swift
102 ND YEAR

To Serve Your Industry Better

When inquiring check 5562 opposite last page

Merger

Starts on preceding page

prior to the merger, that was offered to no other resin customer.)

Further allegations by the complaint:

■ "[Carbide] may exercise the inherent powers of its acquired position to substantially lessen competition or to tend to create a monopoly in . . . polyethylene resin or polyethylene film.

■ "This acquisition (Visking) has the effect of lessening actual or potential competition by foreclosing or tending to foreclose other manufacturers of polyethylene resin from a substantial share of the market for polyethylene resin.

■ "As the principal source of supply for polyethylene resin and the principal competitor of other polyethylene film extruders, Union Carbide has acquired a position whereby it may manipulate prices or use other means to lessen competition or tend to create a monopoly."

According to Carbide's President, **Morse Dial**, "A thorough study (of the merger) was made and the conclusion reached that this action was legal and proper." The study, of course, was made before the company could know the outcome of the Du Pont case.

The court's decision has caused much speculation throughout the industry. And certainly it has and will continue to cause many more "thorough studies" of proposed mergers.

At least one planned merger has already been called off, presumably because of the situation caused by the DuPont decision. Cyanamid and Norwich Pharmacal had announced negotiations and had ironed out most of the details. Then suddenly the companies said that discussions "have been regretfully abandoned because of insurmountable legal difficulties." These "difficulties," although never specified, almost certainly stemmed from the dim view the merger curbers would take of an ethical chemical maker merging with a drug manufacturer.

Interim Report — Sales Boom While Profits Still Fizzle

While the first half of 1957 brought steadily rising sales levels to the chemical industry — a substantial number of companies reported record sales — ever-rising labor and material costs are still keeping profits from an equal gain.

As in the past, some areas of the industry are more or less exempt from the squeeze. The major drug houses and the ethical chemical makers are still showing profits roughly commensurate with their sales increases.

This is also true of companies in rather specialized fields — assuming, of course, that it's the right field. Foote Mineral, for example, has shown a continuously healthy sales profits picture.

The same is true to a lesser extent of the smaller chemical makers. Wyandotte, Victor, Heyden Newport, and Michigan Chemical all showed moderate to healthy profit increases. At the same time, a growing number of the moderate sized companies are showing a profits ratio considerably below the same period in 1956.

Of the biggest companies — DuPont, Carbide, Allied, Dow, Monsanto — only DuPont seemed to avoid the tightening of profits. The first half of 1956 brought DuPont net profits equal to $4.01 per share of common stock, while the same period in 1957 showed profits of $4.30.

Based on per share earnings, Carbide showed a 4.5 percent loss from last year, Monsanto showed no significant change, Allied dropped 13 percent, and Dow showed a loss of about 4 percent.

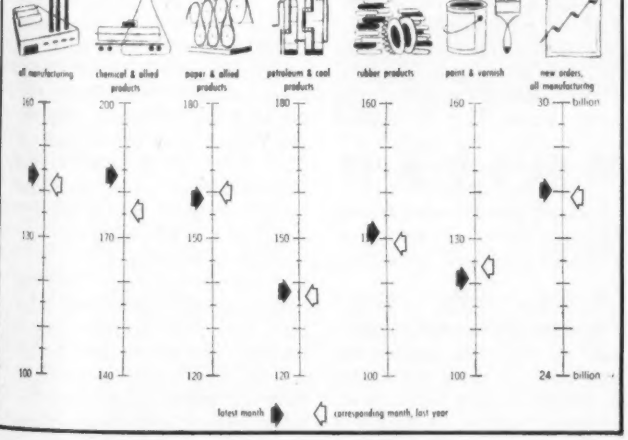
Joseph R. Minevitch Dies Suddenly

Joseph R. Minevitch, President of J. R. Minevitch and Associates, is dead of a heart attack. He was best known for the industrial application and extension of the basic chemical engineering principles to plant design.

He was a member of the American Chemical Society, the American Institute of Chemical Engineers, and the National Society of Professional Engineers.

chemical business INDEX

Production indices, from latest available Federal Reserve Board figures, based on 1947-49=100. New Orders, All Manufacturing, (last column) from latest available Department of Commerce data.



HAVE YOU TRIED FURAFIL®?

Background is Furafil, photographed from 3 feet.

Furafil is a dark brown, modified cellulosic flour having a bulk density of 30-35 pounds per cubic foot. Furafil absorbs water readily, but does not swell appreciably in doing so. It is used widely where powdered, absorptive, organic solids are useful. Industries in which Furafil is used include the following:

FOUNDRY

Furafil is used as a modifying agent for foundry sands to control expansion properties, and to compensate for thermal shock. This reduces the percentage of defective castings.

FERTILIZER

Fertilizer manufacturers use 100 pounds of Furafil per ton of mixed goods to help prevent caking and preserve good drillability in the finished product.

INSECTICIDES AND FUNGICIDES

Furafil's high absorption characteristics make it a fine carrier for liquid ingredients and its anti-caking properties are also of value.

PLYWOOD

A special, finely ground grade of Furafil is used as an extender for phenolic resin glues employed in the manufacture of Douglas fir plywood.

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☐ Use of Pelargonic in High-Baked Enamels

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Address.....
City.....State.....

When inquiring check 5564 opposite last page

Typical plant in Puerto Rico's growing plastic industry

Puerto Rico's "Operation Bootstrap" Has Banner Chemical Year

Puerto Rico's industrialization program — dubbed "operation bootstrap" — has just completed a banner year, particularly in the chemical and petrochemical fields. Within the 1956-57 fiscal year 17 new US affiliates in these industries have gone into operation.

One of the two most significant moves has been the opening of Union Carbide's $28 million ethylene glycol operation in the Commonwealth. Heralded as the real beginning of Puerto Rico's petrochemical industry, the plant is expected to point the way for other US companies to follow.

Since ethylene glycol uses the same feed stock as polyethylene — ethylene from Venezuelan crude oil — there is speculation that Carbide may well establish a polyethylene operation on the Island sometime in the future. Twenty-five plastic molders and fabricators now use in excess of five million pounds of imported resins yearly. This probably isn't enough by mainland standards to justify a resin plant for that market alone now but if the present trend continues there's little doubt that someone will take the step.

And such factors as Puerto Rico's industrial incentives — no US corporate taxes and no local taxes for ten years — as well as a favorable labor market, lower construction costs, and strategic location, will enable US companies to put up plants for markets which perhaps wouldn't justify construction on the mainland.

The second most significant move toward establishment of a major petrochemical industry on the Island is the opening of the Gonzalez Chemical Industries' ammonia plant — the Commonwealth's first. Financed heavily by US firms, the installation cost in excess of $12 million. It also uses Venezuelan crude as raw material and produces an annual 40,000 tons of anhydrous ammonia.

A separate unit on the Gonzalez site turns out 115,000 tons of sulfuric acid yearly. The major end product of the plant is 130,000 tons of ammonium sulfate, all of which will be sold on

the Island.

The future of the Island's industry seems particularly bright. There are two large refineries in operation now and a third is under consideration. Within ten years the Commonwealth expects to have a half dozen — with a total investment of over a half-billion dollars. The total investment in petrochemical operations within the same period is expected to be on the same order.

There's little doubt that Puerto Rico will grow in import as a major chemical center — hence, as a major influence in the mainland's chemical business. Its proximity to certain raw material sources; certain markets, particularly those in the Southeastern US; as well as its inherent economic advantages will no doubt cause a growing number of US concerns to look in that direction in the future.

Water Shortage Problem of Distribution

"On a national scale, the water shortage difficulty is not now one of total quantity; it is of quality and distribution. Furthermore, there is really not a single problem, but a multiplicity of them."

So begins rather an exhaustive report on the US water situation today, compiled by the investment firm of Dominick & Dominick.

What is industry doing about the problem? While no precise estimates can be made from available data, it seems entirely possible that total industrial and utility expenditures for water supply and waste treatment can build up to a rate of $1.5 billion or more annually within the next several years.

Copies are available from Dominick & Dominick, 14 Wall Street, New York 5, N. Y., or for more information check 5565 on the form opposite last page.

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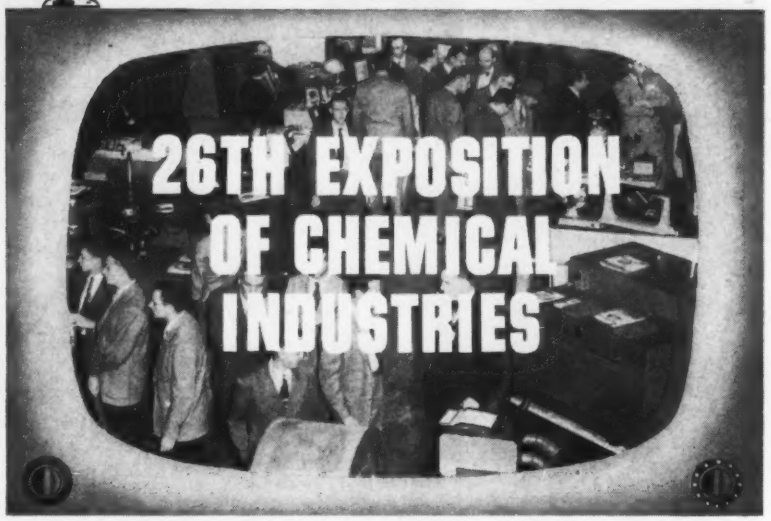
The Time To Tune In On Chemical Progress

December 2-6, 1957

The Program . . .



NEW YORK COLISEUM

For the first time in New York in six years, all under one roof, will be the greatest concentration of new and important developments in chemical materials, machinery and equipment for the process industries. Over 500 informative displays will illustrate the latest advances in the industry, new methods, new products, new ideas, and new ways to cut costs and increase production.

Arrange now to see this tremendous concentration of fact-filled exhibits of equal interest to management, design, production and research personnel.

For your convenience, displays of laboratory apparatus and supplies, chemicals and raw materials, have been grouped separately. It is of great importance to you and your company to see first-hand the results of the continuing search for new processes, more efficient techniques, and new ways to improve your products.

Check December 2-6 on your calendar today, and make a date to attend. ® 4311

26th EXPOSITION OF CHEMICAL INDUSTRIES
NEW YORK COLISEUM, DECEMBER 2-6, 1957

Management: International Exposition Company 480 Lexington Ave., New York 17, N. Y.

When inquiring check 5567 opposite last page

chemical business

Our Growing Industry

Catalytic reformers at Gilsonite's gasoline from-ore plant

American Gilsonite Opens Gasoline-From-Ore Plant

First to produce gasoline from raw material other than crude oil, American Gilsonite has formally opened its refinery at Gilsonite, Colorado.

Plant will produce high-octane fuel from a solid hydrocarbon, Gilsonite ore, mined in Utah and transported to the refinery by pipeline. (Chemical Business, September, 1956).

Secondary product of the operation is high-purity metallurgical coke, used primarily by aluminum producers.

The $16 million plant will process 700 tons of ore daily, turning out 275 tons of low sulfur content electrolytic coke, quantities of fuel oil to produce power at the plant, and 24,600 gallons of gasoline.

Allied To Double Vinyl Chloride Capacity

Allied's Solvay Process division has announced plans to double its capacity for production of vinyl chloride monomer at Moundsville, West Virginia. The original unit went on stream in May, 1946 adjacent to the Moundsville chlorine-caustic and chloromethane facilities.

Other products of the plant are methyl chloride, methylene chloride, carbon tetrachloride and chloroform.

Monsanto Plans Expansion Of Texas City Units

Monsanto has begun two major capacity expansions at its Texas City, Tex., integrated petrochemical operation.

R. K. Miller, Monsanto v-p and general manager of its plastics division, said that a 40-million annual pound increase in styrene capacity will be completed in June, 1958, and that a 12-million pound addition to the plant's acetylene capacity will be completed early in 1958.

The expansion will result in increased use of hydrocarbons and ammonia, raw materials produced by Monsanto's Lyon Oil and inorganic chemicals divisions.

Facilities to boost production of acrylonitrile capacity to more than 100 million pounds, and a substantial addition to the company's polyethylene capacity, are both on schedule.

Koppers Unveils Dual Purpose Plant

With an eye on new markets for coal tar chemicals, Koppers Company recently unveiled its new plant in Arroyo, W. Va. The plant's operation will be two-fold — production of niacin from quinoline and development of higher-boiling coal tar chemicals.

The niacin facility has capacity of 500,000 pounds per year and will be producing both feed grade and USP products. Development plant will make available coal tar chemicals in 500-700°F distillation range in sufficient quantity for market exploration and development.

The million-dollar-plus installation comprises only four acres of the 285-acre site, giving Koppers plenty room for future expansion.

This Month In Chemical Processing

"Management must sell itself to the employee," says Koppers President Fred Foy. "It's been taking a licking from unions for the minds of men."

What can management do about it? This month on page 25, Foy outlines a plan of action. "The unions are doing a terrific job in presenting their side of the picture," he says, "and it's up to management to present theirs, too."

Are chemists and engineers satisfied with various methods that chemical companies employ to reward them for patentable ideas? Their answers to Chemical Processing's survey on the subject reveal some interesting ideas and suggestion. The story begins on page 28.

From underground to roof top . . . this is the house that Velsicol made more economically and with quality!

These are just a few of the products of Velsicol's continuous research to make better products cost less for the good of all.

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Open Gravity Distribution

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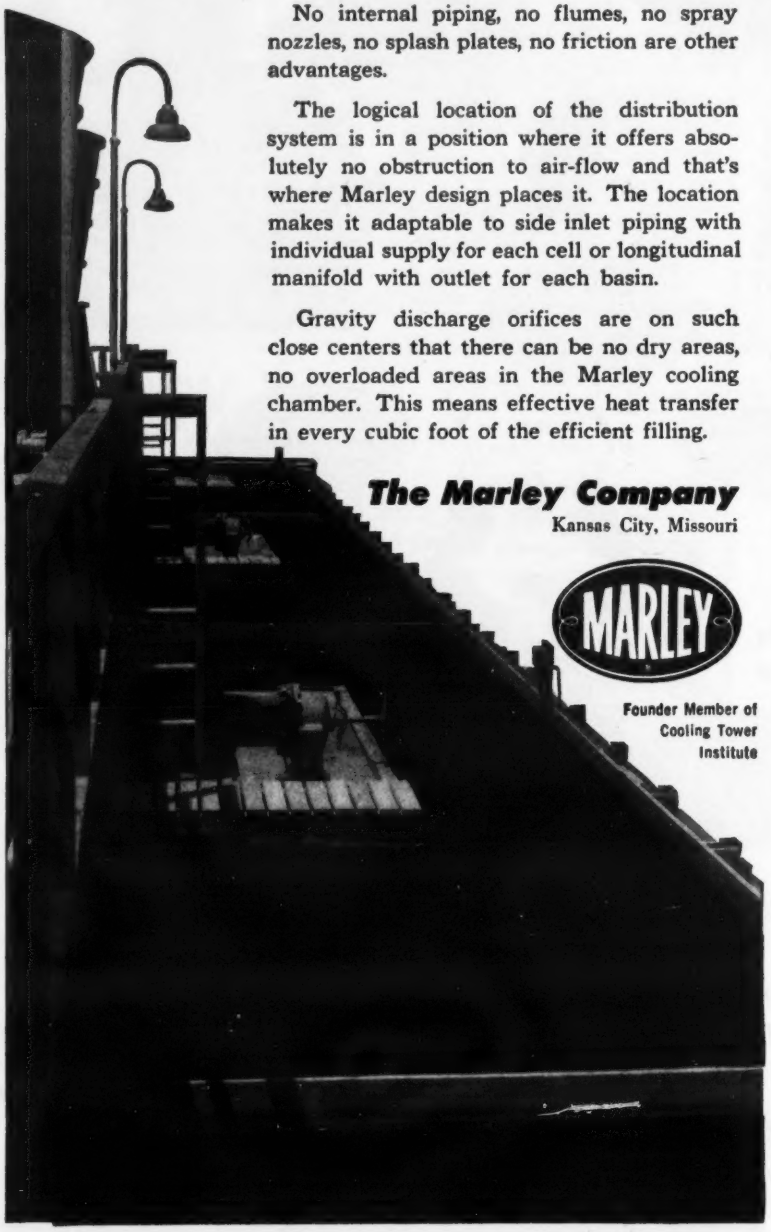
Water seeks a lower level. Hot water distribution on Marley Cross-Flow cooling towers is just that simple, and the advantages of this fundamentally sound system are many.

It is the only method that gives the operator control of the tower. At a glance, he can observe flow in each basin, and the balance between basins. He can change the flow in any cell at will and have positive knowledge of the result — immediately.



No internal piping, no flumes, no spray nozzles, no splash plates, no friction are other advantages.

The logical location of the distribution system is in a position where it offers absolutely no obstruction to air-flow and that's where Marley design places it. The location makes it adaptable to side inlet piping with individual supply for each cell or longitudinal manifold with outlet for each basin.

Gravity discharge orifices are on such close centers that there can be no dry areas, no overloaded areas in the Marley cooling chamber. This means effective heat transfer in every cubic foot of the efficient filling.

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Kansas City, Missouri

MARLEY

Founder Member of Cooling Tower Institute

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chemical business **Finance**

Hercules' Diversification Adds Stability To Operations

WILLIAM R. WHITE
Market Analyst, Hornblower & Weeks

How frequently we see scientific achievements broaden sales horizons for chemical and pharmaceutical concerns. Mankind has been enriched with vast new sources of synthetic strategic materials or of health-giving wonder drugs. But of still greater significance to investors and to federal tax gatherers, corporate income accounts are constantly being enlarged through aggressive development and exploitation of new products.

Although successful discoveries have become so numerous in recent years as to seem almost common-place among research chemists and laboratory technicians, they continue to arouse enthusiasm in the financial marketplaces where investors and traders constantly are searching for situations offering promise of capital gains "at the end of the rainbow."

These thoughts are provoked by the recent announcement that Hercules Powder Company had commenced commercial operations in its modern plant at Parlin, N. J., where its new Ziegler method high density polyethylene is being produced.

Most investors unfamiliar with varied characteristics of individual companies have little conception of the strides Hercules has made in diversification in the last generation. As one of the country's principal powder manufacturers at the outbreak of World War I, the company was called upon to expand facilities tremendously when the United States became involved in hostilities. The armistice found Hercules with excess capacity and a bleak outlook for powder sales.

Necessity for development of products to replace powder spurred research and set in motion a chain of events leading to creation of one of the country's major chemical producers.

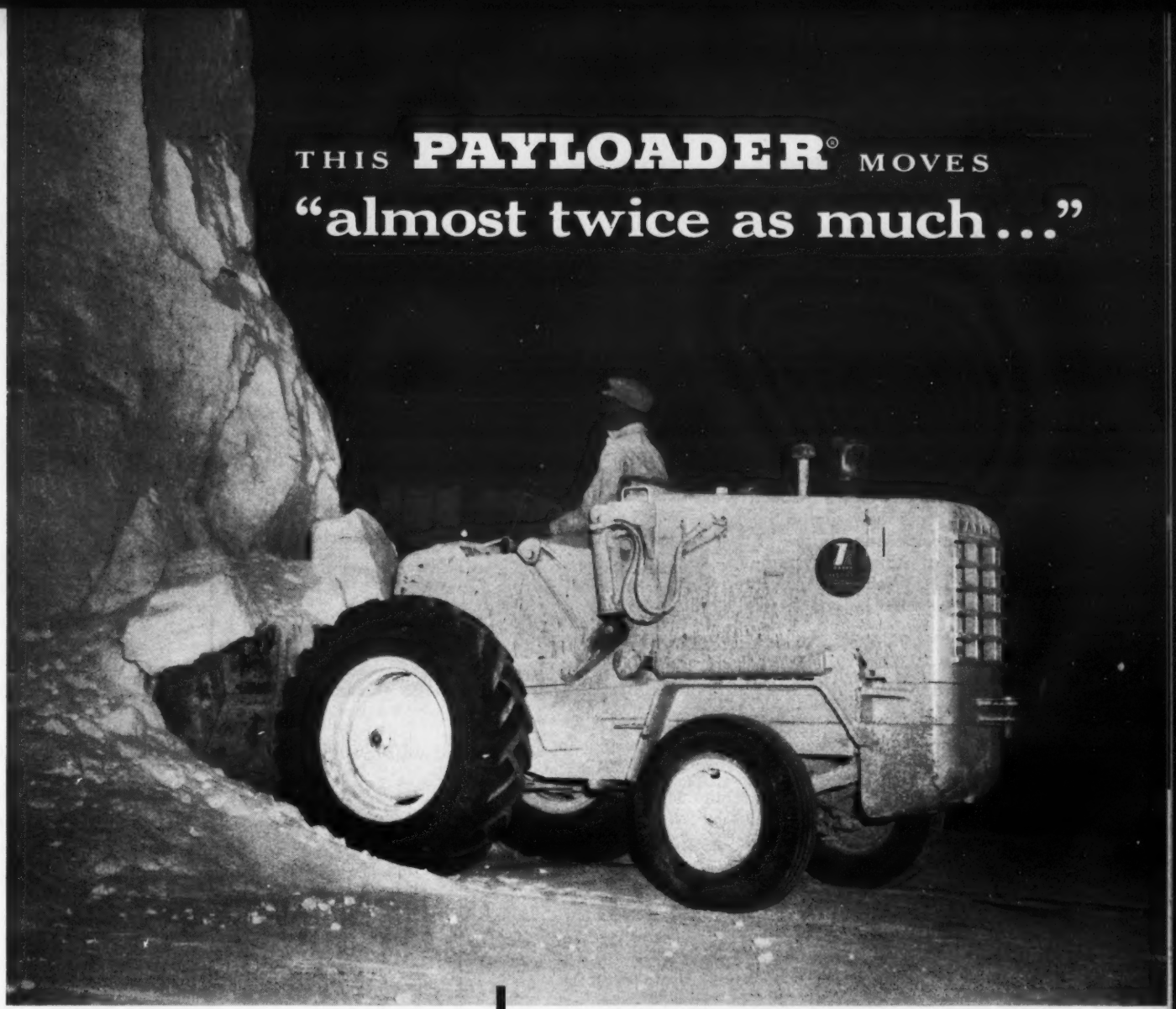
Sales this year seem likely to climb to another record high of $250 million or more, but expenditures on new facilities and costs of starting up plants and moving operations from one location to another may tend to hold down margins. Net profit is being projected at about $2 to $2.25 a share, compared with $2.10 for 1956 and $2.30 for 1955.

Like most chemical companies which follow a policy of plowing back a substantial part of earnings into research and product development as well as into enlargement of productive capacity, Hercules has maintained a conservative attitude on dividends. Distributions are expected to approximate $1.10 a share this year including three 20-cent quarterly payments and a year-end disbursement of 50 cents.

William R. White has been a market analyst with Hornblower & Weeks for the past 18 years. Previously he was financial editor for the New York Evening Post.

White was president of the New York Society of Security Analysts, 1954-55, and vice president of the National Federation of Financial Analysts Societies, 1953-57.

For further investment information on Hercules, write Hornblower & Weeks, 40 Wall St., New York 5, N. Y. or check 5570 on form opposite last page.



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chemical business

Spotlight on people

Three promotions in the finance and engineering divisions of Carborundum Company make **George J. Zimmerman** new controller and **Gilbert J. Stewart** new treasurer of company and its US, Canadian, and Australian subsidiaries; while **Earl Wilson** is elected assistant controller.

Frank J. Weibel is elected to board of directors for American Alcolac Corporation. Weibel heads his own firm of certified public accountants in New York.

Fooshee

Positions of executive vice president and vice president for General Chemical Division of Allied are now held by **Irb H. Fooshee** and **James G. Fox Jr.**, respectively. Fooshee had previously served the division as vice president in charge of development. And at Allied's international division, **William H. Winfield** is appointed a vice president.

Texas-US Chemical appoints **William J. Burke** to post of director of sales.

Dr. W. E. Hanford is made assistant to the president for research at Olin Mathieson.

John P. Edwards becomes sales manager for polyesters in Durex Plastics Division of Hooker Electrochemical.

Todd

With **F. M. Daley's** retirement as president of sponge products division of B. F. Goodrich, **William R. Todd** becomes new president for division. Todd has been v-p since division was founded.

Hugh S. Ferguson has resigned as executive v-p for W. R. Grace. Ferguson will continue with the corporation in an advisory capacity and as member of the board. And at Grace's Davison Chemical Division, **Charles E. Meginnis** is promoted to sales manager for industrial chemicals.

Schuette

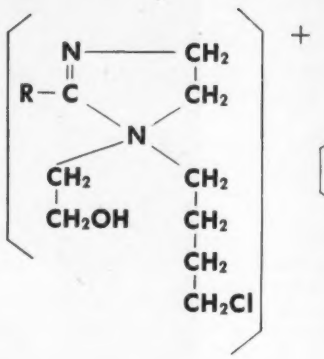
Dr. William H. Schuette, general manager of Dow Chemical's Midland division, is elected to company's board.

Personnel moves announced by Union Carbide . . . **R. S. Abrams** is made general manager and **L. J. Sinnott** is appointed general sales manager of silicones division. **T. J. Coleman** becomes new v-p for Union Carbide Development, division of Union Carbide.

Brig. General Clifford L. Sayre is named director of central chemical engineering for the chemical divisions of Food Machinery & Chemical. And at FMC's Becco Chemical Division . . . **William H. Kibbel Jr.** is appointed to newly created position of manager, market research.

Sy Friedman is appointed to the sales staff at Emulsol Chemical Corporation, a division of Witco, as assistant to the sales manager.

Nalquats



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- Freedom from inorganic salts

the Nalquats... (there are several) are quaternary ammonium chlorides, strongly ionized in water, and have an essentially neutral pH. The long, straight hydrocarbon chain in the cation gives high surface activity, so the Nalquats are effective wetting, foaming and dispersing agents in both water and hydrocarbon systems. They are excellent film-formers, and are strongly adsorbed on many different types of solid surfaces. Their specialized characteristics make them outstanding emulsifiers and excellent corrosion inhibitors.

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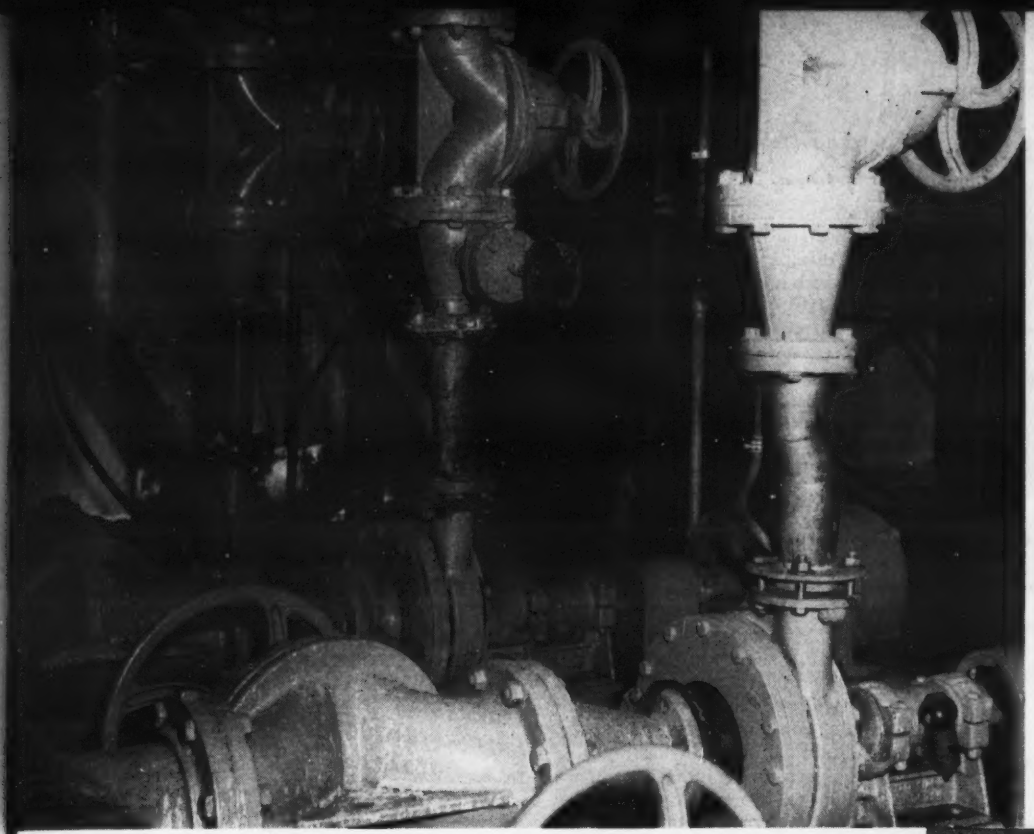
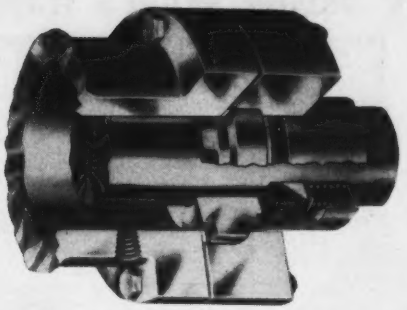


cp NEW SOLUTIONS
of processing problems



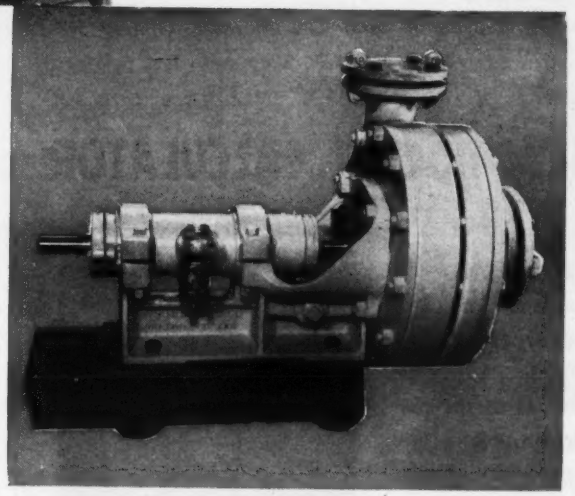
Mechanical seal used on pumps has been found to be well adapted to this service

Some of plastic pumps in service at Courtaulds. These particular units handle 8-10% sulfuric solutions containing CS_2 and H_2S

Fluid end of pump is solid Haveg. This is the principal reason unit is able to handle highly corrosive solutions successfully

While previous alloy pumps lasted only three months . . . up to two years in same service has been furnished by units with fluid end of SOLID PLASTIC that give —

no trouble pumping H_2SO_4 containing high quantities of H_2S and CS_2



GORDON WEYERMULLER,
Associate Editor
With **DAVID RODGER,** Plant Engineer
Courtaulds (Alabama) Inc.,
Le Moyne, Ala.

Problem: Alloy pumps handling 10-13% H_2SO_4 at 195-200°F, in use at the Courtaulds plant, just north of Mobile, lasted only three months. Pumps were used for transferring liquor in evaporation step of acid recovery process. Viscose rayon is manufactured at the plant.

Solution: In July 1954, four centrifugal pumps, which have a fluid end of solid Haveg 41 plastic, were placed in service handling the 10-13% sulfuric at 195-200°F. Haveg 41 plastic consists of a phenolic resin impregnated with asbestos fibers. This plastic has exceptional resistance to most acids, bases, salts, chlorine, and many chemicals except those of a highly oxidizing nature. It can be used continuously at temperatures to 265°F.

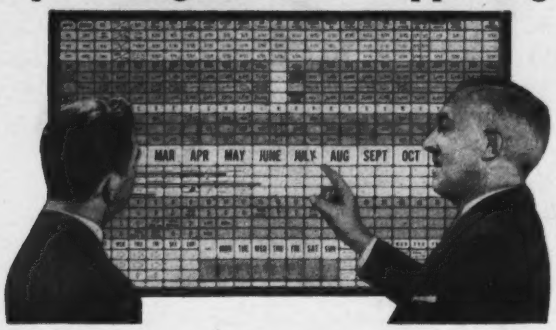
Since fluid end of pump is solid Haveg, the chemical resistance of the plastic exists throughout instead of being confined to a thin surface layer. Pump itself is made in just one casing size, with a 2" discharge and 3" suction. Availability of the pump in just one casing size offers the advantage of standardization. Size and speed of impeller can be varied to give capacities ranging to 325 gpm and heads to 158'. At Courtaulds capacities range from 100 to 300 gpm and heads from 20 to 65'.

After original installation was made at Courtaulds, a number of additional plastic pumps were installed in the plant. In January 1955, several of the units were placed in service handling another liquor, which consists of 10-13% sulfuric at 130-150°F.

In April 1955, several more of the pumps were placed in operation in the acid recovery process. These units handle 8-10% sulfuric at 130-150°F and are also

Turn to next page

You Get Things Done Better By Seeing What's Happening



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Company .....

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When inquiring check 5574 opposite last page

NEW SOLUTIONS

Pumping H_2SO_4

Starts on page 111

subjected to CS_2 and H_2S. In July 1955, a number of the plastic pumps were placed in service to handle wash liquors at 160-180°F. This solution contains up to 1% H_2SO_4 and is full of corrosive CS_2 and H_2S gases, which are given off in the washing stage. Solution being handled here contains about 300-400 ppm CS_2. Two pumps in this service handle 100 gpm of solution with a 40' head, running at 1150 rpm. Relatively slow speed makes it less likely that any packing trouble will be encountered.

All of the pumps are equipped with rotary mechanical shaft seals. Seal is mounted in a sleeve with an outside clamping ring. Flexible sealing members are made of inert Teflon, which permits handling of corrosives at temperatures to 500°F. Springs and metal parts are furnished in alloy best suited to service.

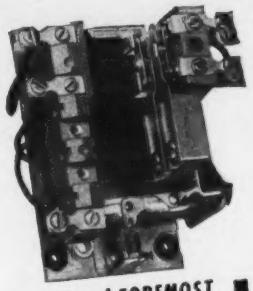
Results: Plastic pumps have given no trouble at Courtaulds while handling the aggressive solutions encountered. About 30 pumps are in operation at the plant with up to two years or more satisfactory service. Mechanical seal used on pumps has been found to be a good seal for this service. Teflon used in seal and Haveg 41 used in fluid end of pump have withstood the severe corrosive conditions.

(Plastic pumps are product of Centrifugal Pump Div., Mission Mfg. Co., Dept. CP, PO Box 4209, Houston 14, Tex. . . . or for more information check 5575 on the convenient Reader Service slip which is located opposite last page.)

(Haveg 41 plastic is product of Haveg Industries, Inc., Dept. CP, 924 Greenbank Rd., Wilmington 8, Del. . . . or check 5576 on form which is located opposite last page.)

(John Crane Type 9 mechanical seals are manufactured by Crane Packing Co., Dept. CP, 6421 Oakton St., Morton Grove, Ill. . . . or for more information check 5577 opposite last page.)

FLOATLESS LIQUID LEVEL CONTROLS



● Catalog also covers Induction Relays, Relay Enclosures, Contactors and Starters, Multiple Pump Controls, Electrode Holders, Starter and Relay Combinations, Special Controls and Panels for the Food Industry.

FIRST and FOREMOST IN THE FLOATLESS CONTROL FIELD

B/W CONTROLLER CORPORATION
2204 E. Maple Road
Birmingham, Mich.

2

When inquiring check 5578 opposite last page

As Demonstrated at ISA show

NEW, MODEL RF-697 ASKANIA Electrohydraulic Valve Actuator

For Valves Requiring Less Than 200-lb. Thrust

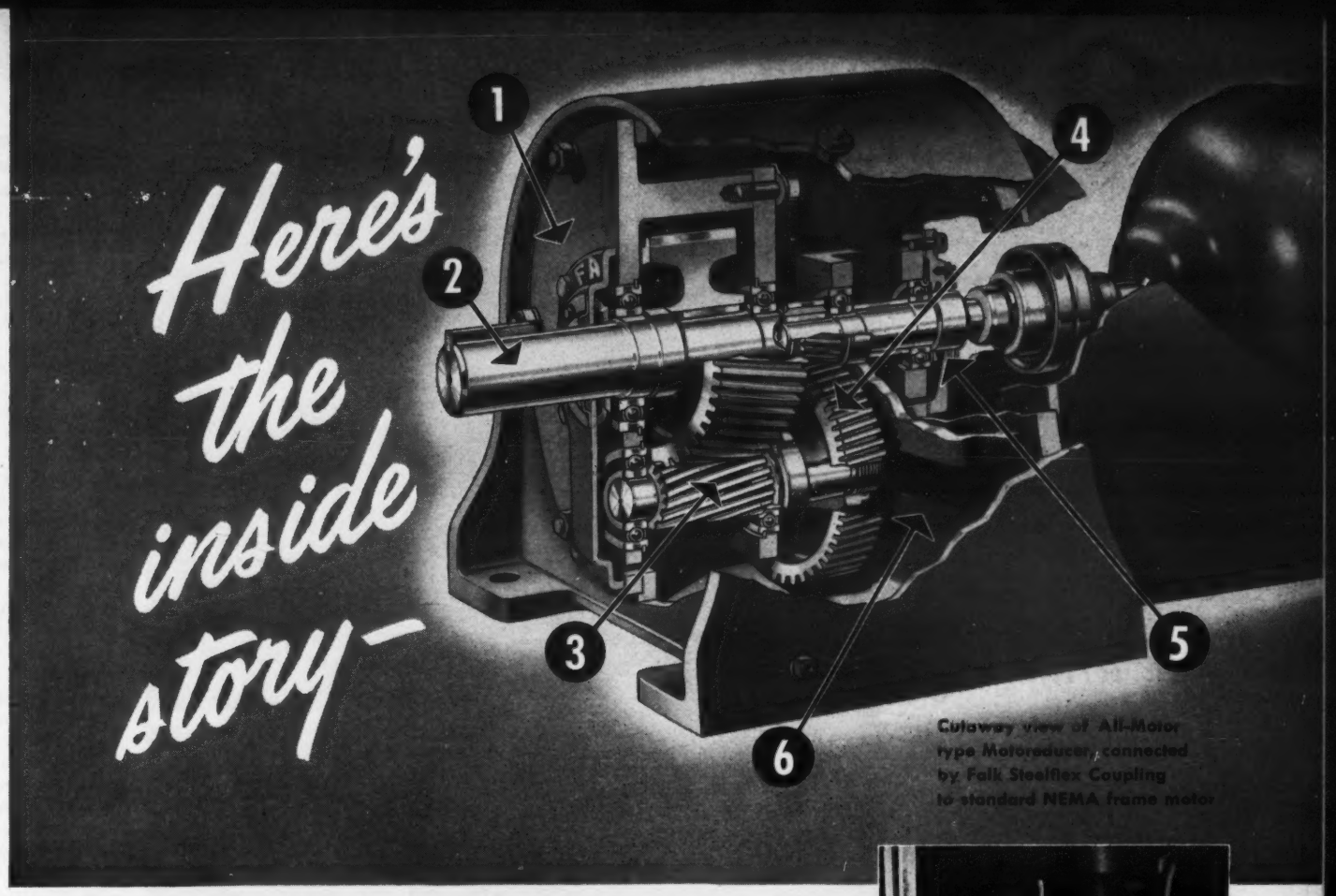
The Askania Model RF-697 Electrohydraulic Valve Actuator comprises a self-contained unit designed for proportional-position control, using signals from an electronic controller, manual station or directly from a measuring element.

Operates from low level a-c and d-c signals. Major advantages are *stability, fast response, dependable operation* and ABSOLUTE MINIMUM MAINTENANCE. Operates directly from controller...mechanically simple...easy to install...competitively priced... explosion proof...used for control of flow, temperature, pressure and other variables in closed or open loop systems...Write for Bulletin No. 38.3 to Askania Regulator Company, 242 E. Ontario St., Chicago, Illinois.

ASKANIA REGULATOR COMPANY
"CONTROLS FOR INDUSTRY"
HYDRAULIC, ELECTRONIC CONTROLS & SERVOS, GENERAL SYSTEMS, ENGINEERING & COMPUTER SERVICE, VALVE ACTUATORS & CYLINDERS

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

When inquiring check 5579 opposite last page



Cutaway view of All-Motor type Motoreducer connected by Falk Steelflex Coupling to standard NEMA frame motor

WHY Falk Motoreducers give better service—have longer life

Here is the "inside story" behind the all-steel All-Motor type FALK Motoreducer's universal reputation as a gear drive unmatched in quality, efficiency, dependability, ease of maintenance and long life. These "In-built" factors are—

1 ALL-STEEL HOUSINGS. Rugged, strong, rigid...all parts are manufactured from heavy steel plate, formed and welded in the Falk Weld Shop.

2 LARGE OVERHUNG LOAD CAPACITY. Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum applied loads.

3 PRECISION GEARING. Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion. Quiet, crown-shaved pinions.

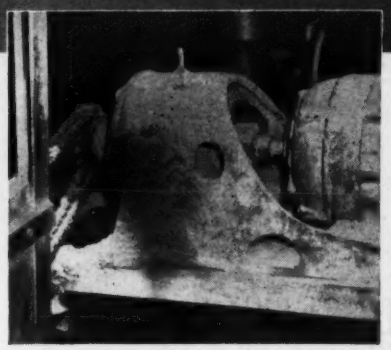
4 EXTRA-CAPACITY GEARING. Special extra-capacity gear-tooth form with larger contact area gives greater strength, higher load-carrying capacity.

5 SEALED HOUSINGS. Splashproof, dustproof, oil-tight construction. Dual closures and one-way vents keep oil in, dust and moisture out.

6 POSITIVE LUBRICATION. Large sump capacity...oiltight construction assures clean lubricant...revolving elements lubricated by direct dip.

When you buy or specify the All-Motor type FALK Motoreducer, you get all these—plus the tremendous advantage of full interchangeability of motors. Switch motors as desired—use any make, style or type of standard foot-mounted motor within the unit's AGMA rating—with a minimum of difficulty or "down time."

Available in sizes up to 75 hp—*with or without motor*—from convenient factory, field or distributor stocks, from coast to coast. **Write for Bulletin 3100.**



60,000 HOURS WITHOUT A FAILURE!

Sixty thousand hours is a lot of hours—but the FALK Motoreducer in the unretouched photo above has served that long without failure or need of repair.

This 3 hp unit is one of over 60 FALK Motoreducers in daily service in an Eastern plant of a large milling company, whose president says, in part:

"One of the main advantages of FALK Motoreducers is their adaptability to any motor. Reducers and motors can be easily interchanged....Our service records confirm the wisdom of our choice of FALK equipment as our standard."

FALK ...a good name in industry

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

For more information on product at right, specify 5580 opposite last page. See information request blank

Another new development using

B.F.Goodrich Chemical *raw materials*

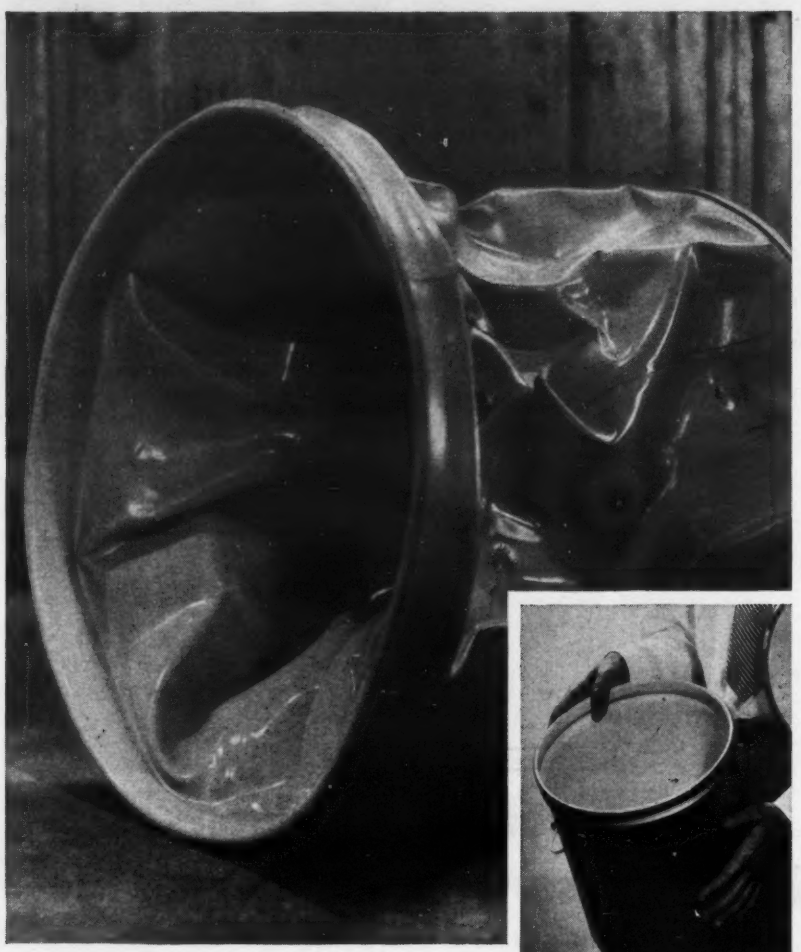
they

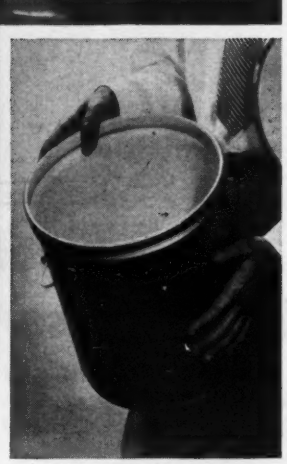
KO'd

the drum—

but not

the coating!





Inland Steel Container Company, *Chicago, Ill. offers drums and pails with this lining in a range of sizes from 1 to 65 gallons.*

LOOK CLOSELY at this intentionally mangled steel drum. No cracks, flaking or peeling of the corrosion resistant coating—an organosol based on Geon polyvinyl resin.

Inland Steel Container Company offers this RDL-4 lining on drums and pails for handling highly corrosive liquids, bulk granulars and abrasive solids.

Linings made from Geon are remarkably resistant to abrasion, acids, alkalis and most chemicals. They are long-lasting, have excellent adhesion and high elasticity and are unaffected by temperature extremes or aging.

Geon-lined steel drums and pails have already been proved successful as shipping containers for many materials. Some of these include: corrosive chemicals, aqueous non-solvent solutions, water emulsions, detergents, disinfectants, 50% lactic acid, phosphoric acid, slurries and abrasive materials like titanium sponge and slips for pottery.

You can put versatile Geon resins and compounds to work for you in many ways. For more details, write Dept. FJ-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

When inquiring check 5581 opposite last page

Acid-setting dyes added via corrosion-resistant saran tubing

Lasts longer, more flexible than pipes formerly used

Problem: At the Luke, Md. plant of West Virginia Pulp and Paper Company, metal pipes and rubber hose used for adding acid-setting dyes to paper stock corroded and had to be replaced in one month.

Dilute dyes are added to raw stock to produce varying shades of cream and blue-white papers. Dyes are mixed in acid solutions in stainless steel tanks. Dilute dye solutions are then added to pulp slurries continuously in small quantities.

Solution: Plant started using ¼"-diameter saran tubing for transferring the dye solutions to the raw stock.

In a recent study of plastics, it was shown that saran is one of the most corrosion-resistant of the commercial plastics available for pipe and tubing.

Results: Compared to the one month's service obtained with former pipe and hose, saran tubing is still in good condition after nine months service. Non-contamination and added flexibility are also advantages found for the saran tubing.

Saran tubing has also given excellent service when used for adding a 2% alum solution for pH control of acid used for dye solution.

(For further information on saran tubing contact Saran Lined Pipe Co., Dept. CP, 2415 Burdette Ave., Ferndale 20, Mich. . . . or check 5582 opposite last page.)

Silicone insulation

Several complete case histories on value of rewinding motors with silicone insulation are featured in six-page bulletin. Brief description of insulation, its history, and its importance to motor maintenance men is included. Bul 10-104 — Dow Corning Corporation, Dept. CP, Midland, Mich. Check 5583.

Water Supply

Starts on page 36

Ni-resist disc, stainless steel shaft, and silicone-lubricated bronze shaft bearings. Body has duck-reinforced gum rubber insert lines to provide water-tight seating of disc in positive closure.

Each valve is equipped with a hydraulic cylinder and limit switch.

After water leaves intake pumping system, it enters two 78" headers. These large pipes have 4"-thick walls made of steel imbedded in concrete. These two headers go to all refinery units, providing duplicate service in case one main breaks. There is 7000' of this 78" diameter pipe in refinery cooling water system.

At point where water enters each refining unit, twin-basket strainers are installed in a pit (Fig. 6). There are 12 pits of this type in plant, one for each refining unit. These strainers remove any remaining contaminants. Twin-strainer has two basket compartments in one body. Either compartment can be closed off for cleaning screen. All twin-strainers above 16" in size have motor-operated valves. After water leaves refining units, it passes through three huge guard basins, and any oily water goes through a standard API separator so that water is returned to river in an uncontaminated state.

Another interesting feature of plant is the two vertical tanks (Fig. 2) installed near the nine pumps for water-hammer protection. If all pumps suddenly were shut off through a power failure, the moving water in the large lines would create a vacuum. This would break the water column in lines and form a void. Backflow of water from system would cause a water hammer when it refilled the line. It was calculated that this water hammer would create pressures that would burst the concrete pipe. The two tanks, which are partially filled with water, are connected to the 78" lines through check valves. If pumps went off, water from tanks would be

Turn to page 122

Synchronous Speed with Induction Simplicity

New Synduction Motor

...has uses in:

- Synthetic Fiber Production
- Wire Drawing
- Plate-Glass Conveyors
- Packaging Machinery
- Food Processing
- High Speed Cameras
- Metering Pumps
- Electronic Computers
- Printing Presses
- Frequency Converter Sets
- Drives for Electronic Power Supplies
- Continuous Bristle Cutting

Do YOU Have an Application?

Allis-Chalmers engineers are anxious to help you determine where *Synduction* motors can improve your operations. Call your A-C office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin, for Bulletin 51B8440.

Here's More...

- **Constant speed, regardless of load or voltage, depends only on frequency**
- **Synchronized speeds for a number of motors**
- **Adjustable speed by frequency control at any speed setting**

Allis-Chalmers new development—the *Synduction* motor — now makes these characteristics available at low cost. The sturdy frame and simple design, similar to that of a squirrel-cage motor, eliminates collector rings, brushes and rotor insulation — cuts maintenance. Other important advantages include across-the-line starting, wide range of speeds and high efficiency.

Synduction is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-9118

When inquiring check 5584 opposite last page

Haveg Equipment Solves Corrosion Problems in Handling
ACIDS · ALKALIS · SOLVENTS · HF · FUMES

First name in Corrosion Resistant Equipment

HAVEG®

HEAT EXCHANGERS
PROCESS TANKS
FUME DUCTS
PIPING
PUMPS
VALVES

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When inquiring check 5585 opposite last page

Cowles Chemical Company used fatty acid — intermittently — on a scheduled basis. Tank cars, demurrage, and production delays were costly. Now . . .

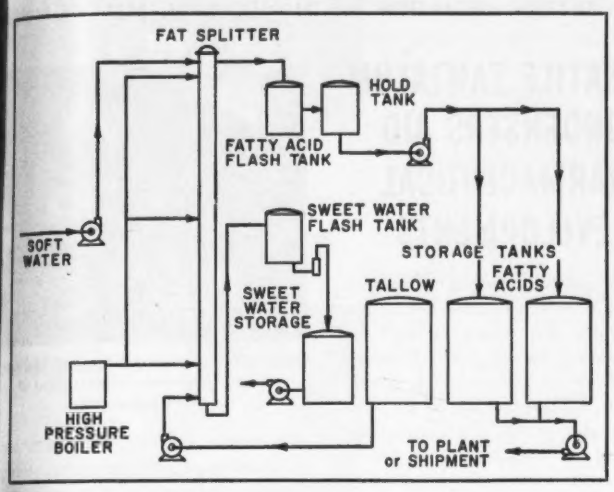
WILLIAM C. CLARKE,
Assistant Editor
K. R. OLSON, Chief Engineer
Cowles Chemical Company
Skaneateles Falls, New York

Problem: Delayed shipments of fatty acids — with loss in production, worries on color, demurrage costs, scheduling of production . . . all the difficulties of a limited small-scale operation with only one benefit, small capital investment, were plaguing management of Cowles Chemical Company.

Cowles Chemical is engaged in manufacture of industrial chemicals with plants at three locations. Considerable quantities of animal fatty acids are used at the Skaneateles Falls, N.Y., plant for production of a complete laundry detergent. Since the fatty acid was used intermittently on a scheduled basis, tank cars were used as storage tanks during processing runs.

Inability to switch at required times occasionally caused loss in production time. Without full control over fatty acids received, color was sometimes a problem. Despite careful scheduling, some production trouble was encountered because of delayed shipments. Another problem was necessity of balancing production to full tank cars.

Solution: Installing a 500-pound per hour continuous high-pressure hydrolizer for



Fatty acid flow sheet on splitting column. Decolorized tallow furnishes a fatty acid with maximum color of Gardner 7

Package fat splitter eliminates necessity for tank car storage of fatty acid. Small enough for production of small quantities of acid desired, package unit also has short payout time

"package" fat splitter cuts production costs

splitting bleached fancy tallow, Cowles Chemical began producing the equivalent of distilled fatty acids. Unit was purchased by Cowles since investment could be justified on basis of its own requirements — alone.

Using Colgate-Emery process, unit operates by splitting feed stocks without need of a catalyst. Unit operates continuously, providing advantages of low operating costs with uniformity of product. Acid treatment is not required for better grade feed stocks. Only a light acid boil is required for low grade fats.

In operation, fat at 150°F is pumped into lower section of column. Fat is dispersed into small droplets by a sparge pipe. Small droplets of fat then rise in column. Fat is split by direct contact with sparged steam at temperature of 500°F. Fatty acid passes through a heat transfer section of column to recover heat. Fatty acid then leaves column, being held in a storage tank until used.

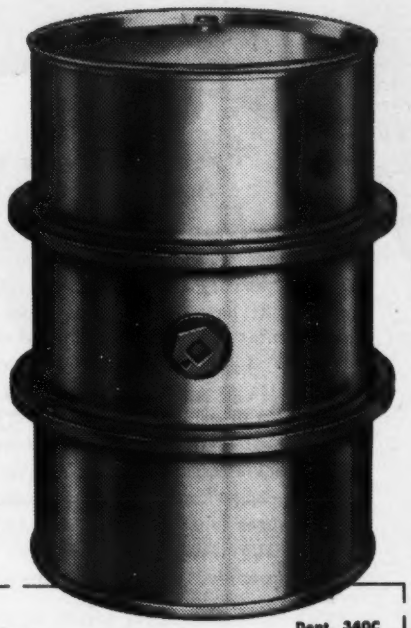
Glycerin solution produced is approximately 12 percent. To keep additional expenditure at a minimum, sweet water is not concentrated. Near-by processer purchases the 12 percent glycerin solution from Cowles Chemical.

Cowles' specifications for fatty acid included a maximum color of Gardner 7. Normally, such a color specifica-

Turn to page 119

whether you need 1 or a carload

CALL ON INLAND FOR HIGH QUALITY STAINLESS STEEL DRUMS



If you ship chemicals, acids, pharmaceuticals, foods or other products that require the extra protection of stainless steel, it will pay you to check the many advantages of Inland Stainless Steel Shipping Drums. Manufactured in a range of sizes from 15 to 60 gallons, from many types of stainless steel, with double-seamed or all welded construction, with all modifications necessary to meet ICC specifications 5 and 5C. Inland can supply the right drum for your requirements . . . whether you need 1 or a carload!

One of Inland's Stainless Steel Shipping Drums. An ICC 5C drum, 55 gallon, 16 gage, all welded construction (flanges, heads, bottoms and side seams) I-bar rolling hoops. Many other sizes and types are available. Call on Inland for your process drums and stainless steel shipping pails too!

"The Use and Care of Stainless Steel Drums" Dept. 340C

Here is a useful, new booklet. It gives valuable information on how to use and get maximum life from stainless drums and fully describes the Inland line. Send in this coupon for your free copy.

Also:
_____Have your representative contact me.
_____Give me a quotation on_____ICC_____Drums.

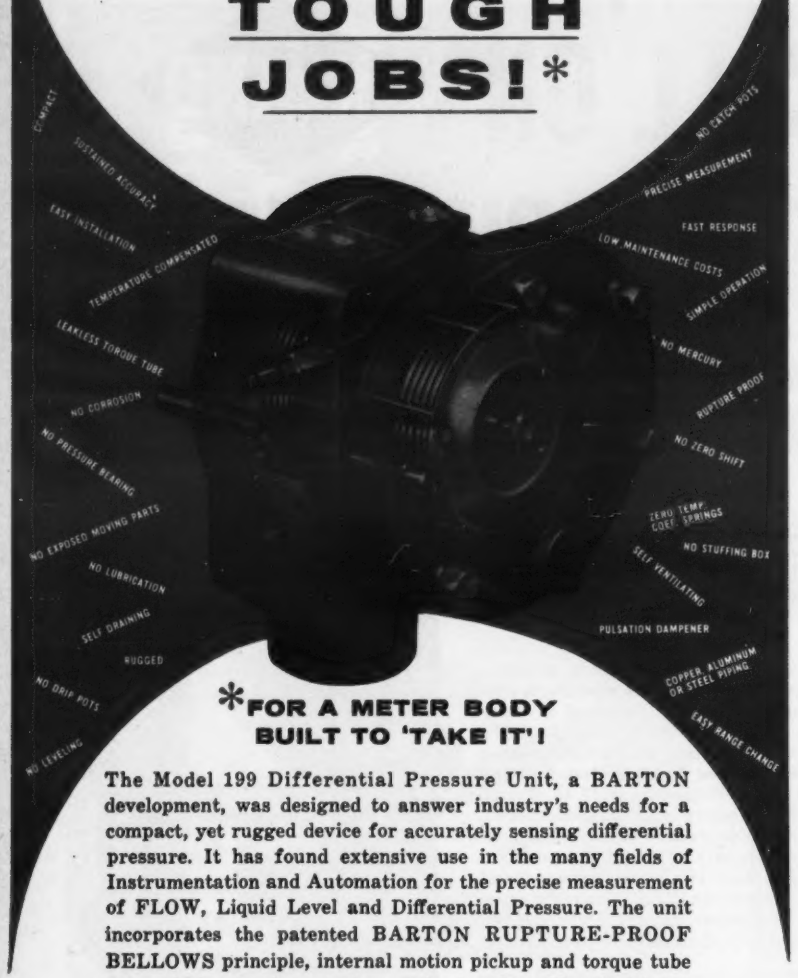
Name_____Title_____
Company_____
Address_____
City_____Zone_____State_____

INLAND STEEL CONTAINER COMPANY Dept. 340C
Division of Inland Steel Company • 6532 South Menard Avenue Chicago 38, Illinois • Plants: Chicago, Jersey City, New Orleans, Cleveland and Greenville, Ohio

Full line of steel and stainless steel shipping containers, including galvanized and heavy duty ICC drums.

When inquiring check 5586 opposite last page

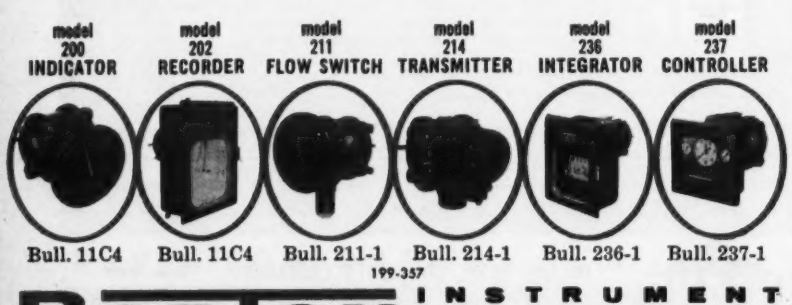
WANTED: TOUGH JOBS!*



*FOR A METER BODY BUILT TO 'TAKE IT'!

The Model 199 Differential Pressure Unit, a BARTON development, was designed to answer industry's needs for a compact, yet rugged device for accurately sensing differential pressure. It has found extensive use in the many fields of Instrumentation and Automation for the precise measurement of FLOW, Liquid Level and Differential Pressure. The unit incorporates the patented BARTON RUPTURE-PROOF BELLOWS principle, internal motion pickup and torque tube transmission to the exterior of the housing. The Model 199 Differential Pressure Units are available with differential pressure ranges from 0-20" W.C. to 0-50 PSI with safe working pressures to 6,000 PSIG. All BARTON bellows units are hydraulically tested and overranged to 1.5 times the safe working pressure, regardless of the differential range.

For further information, contact Barton Sales Representatives in principal cities.



199-357

BARTON INSTRUMENT CORPORATION

580 MONTEREY PASS ROAD, MONTEREY PARK, CALIFORNIA

When inquiring check 5587 opposite last page

Fansteel

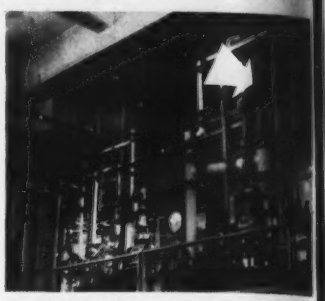
Corrosionomics

REGISTERED U. S. PATENT OFFICE

A JOURNAL OF USEFUL INFORMATION FOR THE SOLUTION OF CORROSION PROBLEMS

VERSATILE TANTALUM CONDENSERS AID PHARMACEUTICAL DEVELOPMENTS

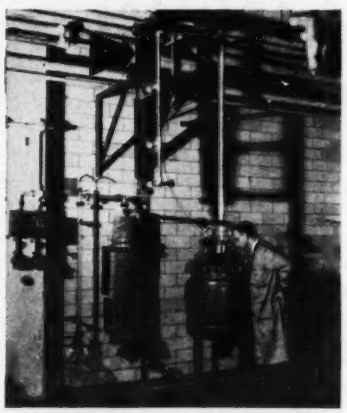
Fansteel tantalum tapered condensers are prominent items among the equipment in two pilot plants operated by the Chemical Development Department of Abbott Laboratories, North Chicago, Ill. These condensers are used in the development of new pharmaceuticals and see constant service under highly corrosive processing conditions. Sulfonyl chloride, thionyl chloride, phosphorus oxychloride, phosphorus pentachloride, hydrogen bromide, hydrogen chloride, and nitric acid are but a few of the reagents handled.



Installation of Fansteel tapered tantalum condenser (arrow) in pilot plant of Abbott Laboratories

Over 17 Years in Corrosive Service

In one plant, two condensers have been in use since 1941 and neither has shown any sign of corrosive attack. In the other plant, two 6" x 2" x 60" units are used—one as a knockback condenser and one for distillation and purification of intermediates requiring special handling.



Special installation of a 6" x 2" x 60" tantalum tapered condenser in the Chemical Development Department of Abbott Laboratories, North Chicago, Illinois. Connected to a 30-gallon Pfaudler glassed steel vessel, the condenser operates under vacuum at 0.5 to 1 mm of mercury, absolute pressure.

Product Purity Maintained

On occasion, the latter system is used to distill an extremely corrosive unsaturated halogen compound. This particular intermediate is subject to polymerization for which ferric chloride is a catalyst. When stainless steel was tried for the condenser, sufficient ferric chloride was formed as a corrosion product to cause polymerization. Inasmuch as tantalum is unaffected by the reagents involved, no contamination results, and, of course, no polymerization is encountered.

In the processing of Abbott pharmaceuticals, tantalum plays an important role. It is noted for its extreme resistance to a wide variety of corrosives and it has the ability to perform several important steps in the processing without affecting the purity of the product.

Free Tantalum Test Kit

A corrosion test kit, available without charge to research technicians, contains both tantalum sheet and wire. Request it on your letterhead.

The above condensation is typical of the articles which appear in CORROSIONOMICS, a Fansteel publication. Mail us your name for inclusion on our free mailing list.

G5744

For further data on the above, write:

FANSTEEL METALLURGICAL CORPORATION

CHEMICAL EQUIPMENT DIVISION

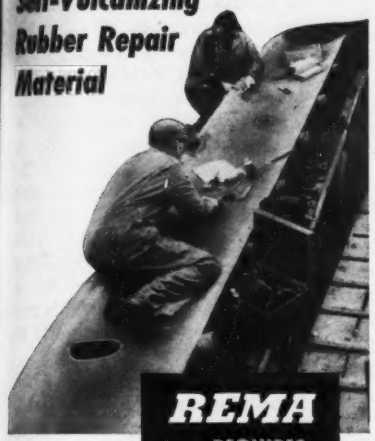
NORTH CHICAGO, ILLINOIS, U. S. A.

FANSTEEL 1907 1957 Golden Anniversary of Progress

When inquiring check 5588 opposite last page

Use REMA to add years of life to your Belts

REMA is the New and Amazing Self-Vulcanizing Rubber Repair Material



REMA REQUIRES
- NO HEAT
- NO HEAVY EQUIPMENT
- NO CURING TIME DELAY

• REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage—*when repair work is completed belts may be returned to service immediately.*

• REMA seals out moisture, reduces mildew, rot and deterioration — the great enemies of conveyor belts. Your own maintenance man can quickly repair your belt — it doesn't take a skilled belt mechanic to use REMA.

• Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

Order from your Flexco-Alligator distributor

Write for Folder No. R4

FLEXIBLE STEEL LACING CO.

4649 Lexington St., Chicago 44, Ill.

REMA SELF-VULCANIZING RUBBER REPAIR MATERIALS

When inquiring check 5589 opposite last page

Fat Splitter

Starts on page 116

tion could be met only by drying and decolorizing the split product. However, a source of decolorized tallow was located locally.

Packaged unit is automatically controlled with physical attention limited to hourly samples. Twice a shift, product in hold tank is drained free of water and transferred to storage. Sweetwater shipments are made every two or three days. Carbon-steel tanks are used for storage of tallow and sweetwater with light-gage stainless tanks used for product storage. All tanks are insulated and equipped with coils. Unloading and shipping facilities are designed for both tank cars and tank trucks.

Results: Installation of the "packaged" fat splitter, complete with storage tanks, at Cowles Chemical has eliminated lost production time caused by delayed incoming shipments of fatty acid. With a local supplier, delivery is fast — and as needed. Color worries on finished product because of "off-spec" fatty acids have been reduced. Scheduling of production has been eased.

Since production costs are key to successful operation of the packaged unit, with amount of capital investment involved, careful records have been kept. Based on Cowles use of fatty acids, payout on investment, approximately $70,000, will be fifteen months before taxes.

Production costs are roughly equivalent to value of sweetwater produced. Net cost of fatty acid produced is approximately equal to raw material costs. (Production costs include all fixed charges on investment.)

Packaged unit has sufficient excess capacity so that fatty acids can be offered for sale, if necessary. Operating profit could therefore be increased.

(Continuous package fat splitting unit is product of Chemical Plants Division, Blaw-Knox Co., Dept. CP, 180 N. Wabash Ave., Chicago 1, Ill. Check 5590 on form opposite last page.)

This Trap Would NEVER FREEZE!

● Anderson Quik-Flex Thermostatic Steam Traps are guaranteed freeze-proof! Ideal for tracer lines, meter boxes, and all outdoor steam processing found in chemical, refinery, etc. Made by the most famous name among steam trap manufacturers.

FREE QUIK-FLEX BULLETIN

THE V. D. ANDERSON COMPANY
division of International Basic Economy Corp.
1948 West 96th Street • Cleveland 2, Ohio
Please send your Bulletin 257 describing your Quik-Flex Steam Traps guaranteed freeze-proof.

*Name*_____
*Company*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

When inquiring check 5591 opposite last page

Here's the Most Modern Control Equipment to Protect Your Product from CRP*

* Corrosion-Resistant Problems

This spectrometer in the WAUKESHA Metallurgical Laboratory provides the most positive assurance that *your* corrosion-resistant castings correspond exactly to the specified formula . . .

Every heat is checked and so quickly can spectrometer readings be obtained that any correction can be made in the foundry *before the metal is poured.*

There is simply *no* guesswork when WAUKESHA FOUNDRY Company is entrusted with your corrosion-resistant castings.

If you have corrosion-resistant problems* or difficulty in obtaining pit-free, uniform, free-machining castings in a production run — turn your troubles over to WAUKESHA — for WAUKESHA has one of the finest metallurgical laboratories in the industry . . . Naturally, not a bit of obligation. Why not write today?

WAUKESHA FOUNDRY COMPANY

5701 Lincoln Avenue • Waukesha, Wis.

When inquiring check 5592 opposite last page

Valves using Teflon disc give tight shutoff 15 times longer

Maintenance costs are lower at Diamond Alkali

Problem: At the Diamond Alkali plant in Belle, W. Va., process valve failure was a major problem from two standpoints: 1) replacement and labor costs, and 2) possible contamination of finished product due to leakage. Amount of product lost to atmosphere through dripping valves was substantial.

Standard valve for process use was a globe valve. This was chosen over gate design due to latter's tendency to foul when rust and other solids accumulated in gate seating slot, thus preventing proper seating and tight shutoff. Most globes that failed had etched seats and discs, resulting from the action of traces of HCl and moisture in the crude products.

Besides HCl and moisture, crude product (a mixture of methylene chloride, chloroform, and carbon tetrachloride) contained a trace of ferric and ferrous chlorides. An alloy was selected for valve seats that offered resistance to both ferric chloride and wet HCl.

A seat and disc were made of this alloy in shop and installed in valve. This valve gave good service. However, no valve manufacturer would make a valve of this construction at a reasonable price. Machining of such a tough metal was too costly. A more economical solution was sought.

Solution: It appeared that a Teflon disc, because of its ability to flow into shallow crevices, might be superior to the standard disc. Such proved to be the case. A valve manufacturer agreed to furnish globe valves equipped with a modified disc holder and Teflon disc at a reasonable cost.

A feature of this valve is the way the disc holder is fastened to the stem by a T-slot. Backseating arrangement allows valve to be repacked under pressure while wide open. Protruding packing gland is held rigidly by a heavy hexagonal nut. This nut acts as an additional guide to stem.

Results: According to J. H. Shadle, of the Diamond Alkali plant, valves equipped with the Teflon disc have been found to give a tight shutoff for about 15 times longer than a valve equipped with a disc of ordinary composition. Maintenance costs have been lower. Since the Teflon disc is finished on both sides, it can be reversed and used again. Seats, when etched too deeply for further use, can easily be lapped with fine emery cloth placed on a flat table. Seating surface in modified valve is on top of seat rather than in the ID.

(For further information on globe valve equipped with modified disc holder and Teflon disc, check 5593.

"I think you've hit paydirt, Doctor Scott!"

Thanks to James V. Redding, The Central Pharmacal Co., Seymour, Ind.

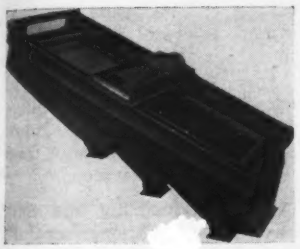
$AlCl_3$ screening problem solved with air-tight vibrating unit

Stops release of toxic fumes, cuts maintenance

Problem: Screening aluminum chloride represented major costs and was a constant production bottleneck at Mencro Chemical and Metallurgi-

cal Corporation, North Tonawanda, N. Y. The conventional screening equipment would leak, releasing toxic HCl fumes, and required almost constant maintenance to keep operating. Operators had to wear masks and special clothing to protect themselves from the fumes.

Solution: Company installed an air-tight, vibrating motor screen for the operation. Unit is powered by a totally-enclosed 1.5 hp motor and vibrates 3600 times per min. Non-vibrating hopper which encloses screen occupies very little head room and is fabricated from 12-gage steel. The float mount absorbs 100% of vibration. Total weight of machine and hopper is slightly over 1200 lb.

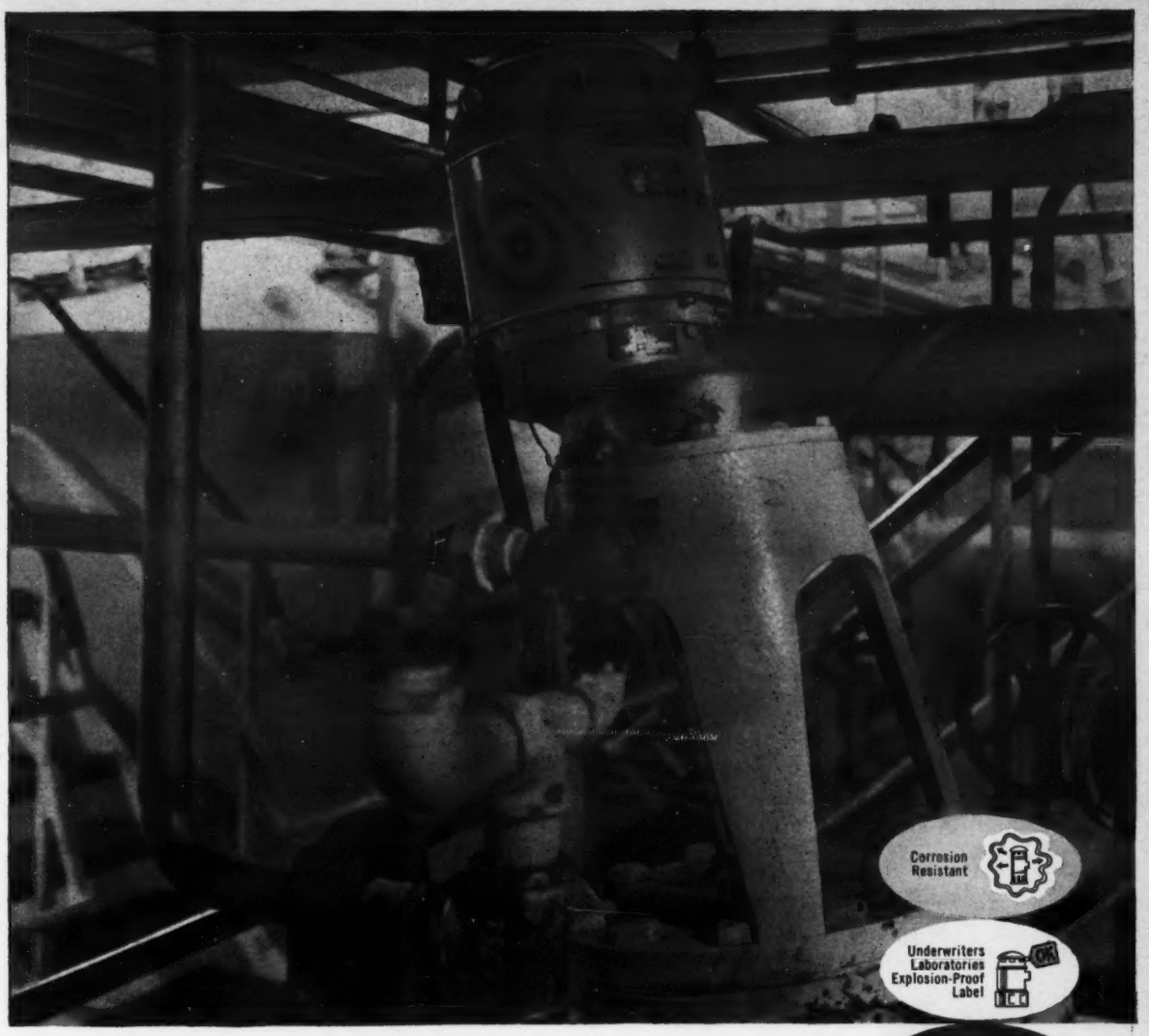


Air-tight vibrating screen, occupies low head room, operates with no external vibration, performs triple separation

Machine is simple to operate — one man handling complete crushing and screening operation. Screen performs three different separations, grading 20 mesh, ¼" opening, and ½" opening at rate of several tons per hr. This is accomplished by having feed contact finest opening cloth first, then the next larger, etc.

Results: Screen operates air-tight with no external vibration. Fumes have been eliminated, making it unnecessary for operators to wear protective clothing. Maintenance has been reduced to simple, daily lubrication, performed while machine is operating.

(Vibrating motor screens are product of Derrick Manufacturing Company, Dept. CP, 590 Duke Road, Buffalo 25, New York . . . or for more information check 5594 on form opposite last page.)



This motor battles corrosion

Louis Allis explosion-proof chemical motors are ideal for chemical, petrochemical, plastics, and paint installations.

It takes a motor designed for the chemical industry to withstand the abuse of this corrosive service. The 2 hp totally-enclosed fan-cooled explosion-proof motor shown above on a mixer drive is typical.

Few applications are subjected to such extreme environmental conditions. To meet them, Louis Allis chemical motors are built with cast-iron housings to provide exceptional corrosion resistance to etching vapors and corrosive gases. Motor shrouds are stainless steel, fans are bronze. Even the nameplate is made of stainless steel to preserve important motor information like bearing sizes and the wiring diagram for simplified servicing.

Louis Allis insulation is designed to withstand exposure to acids, alkali, or moisture to assure you of dependable service. Locked bearing construction prevents rotor drift . . . extends bearing life.

We'll gladly offer expert field application service. Contact your Louis Allis District Office or write The Louis Allis Company, 448 East Stewart Street, Milwaukee 1, Wisconsin. Ask for Bulletin 1050.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

When inquiring check 5595 opposite last page

World's Largest Sea Water Salt Plant Proves Crane Valve Quality

Three times longer valve life on corrosive weak brine

Before Leslie Salt Co. changed to Crane diaphragm valves here in its Newark, Calif., plant, lubricated plug cocks were causing constant maintenance. The highly corrosive condensate and weak brine solution being handled pitted the plugs, started leakage, and forced replacement of the cocks every 2 years.

To date, the Crane neoprene-lined diaphragm valves have already given 3 times longer service than the cocks. In these valves, the diaphragm isolates the working parts from line fluid, and the neoprene lining protects the disc and body. Result: after 6 years of cost-free usage, the Crane valves are still seating tightly with easy operation.

Valve performance like this can only come from correct design, better materials, precision assembly, and thorough testing—features you cannot detect from outside appearance. Why gamble with your valves and fittings? Specify Crane and be sure of top-quality flow control.

Get Crane Folder AD-1942 on packless diaphragm valves. See your Crane Representative for a copy, or write Crane Co., address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

When inquiring check 5596 opposite last page

Water Supply

Starts on page 36

released to the lines as soon as the pressure in the pipes dropped below the static head of the tanks, thus preventing water hammer.

Results: To engineers at Tidewater, the cooling water pumping system is an ideal installation. It furnishes the huge volume of water needed, with every precaution being taken against pump failure and consequent shutdown of refinery. The nine vertical pumps operate quietly, continuously, and safely.

One operator per shift takes care of entire cooling-water system plus the guard basins and API separator used to skim return water.

(Major engineering and construction for refinery was C. F. Braun & Co., Dept. CP, Alhambra, Calif.)

(Vertical pumps are product of Byron-Jackson, Div. of Borg-Warner Corp., Dept. CP, PO Box 2017, Terminal Annex, Los Angeles 54, Calif. . . . or check 5597 on form opposite last page.)

(Pump motors, switchgear, and transformers were furnished by Allis-Chalmers Mfg. Co., Dept. CP, 1126 S. 70th St., Milwaukee 1, Wis. . . . or check 5598.)

(Traveling water screens were supplied by The Jeffrey Mfg. Co., Dept. CP, Columbus 16, Ohio . . . or check 5599.

(Butterfly valves were manufactured by W. S. Rockwell Co., Dept. CP, 200 Eliot St., Fairfield, Conn. . . . or check 5600.)

(Twinstrainers are product of Elliott Co., Dept. CP, Jeanette, Pa. . . . or check 5601.)

Tables of functions . . .

. . . for calculating flow of liquid propane and butane have been prepared by G. W. Edwards and G. L. Pratt, American Oil Co. See page 91.

INTRODUCING THIS NEW

"EXECUTIVE SIZE"

OF CHEMICAL PROCESSING MAGAZINE

This issue of CHEMICAL PROCESSING is *different*. Lay this copy alongside an earlier issue (before July) of CP . . . compare them. Hold the new issue in your hands . . . slip it into your brief case. It "fits" . . . it invites easy reading . . . for busiest-of-all chemical executives.

IT NAMED ITSELF "THE EXECUTIVE SIZE" . . .

for the new format has been styled for today's busy executives . . . expanded main editorial sections covering subjects vital to the management team in chemical processing industries . . . prepared in the established Putman editorial style.

AN EARLIER ORIGINAL DESIGN IMPROVES . . .

Nineteen years ago Putman Publishing Company created the original design for business magazines, known as "King Size" . . . bringing heretofore unknown visibility and greater effectiveness in editorial presentation (yes, for advertising, too). Scores of other magazines adopted this format, and use it today.

Now, the "Executive Size" brings you new advantages . . . while retaining the best of the old.

Turn to page 50. Look at the unusually effective presentation of the editorial matter . . . the "cinemascopic" wide-screen layout.

Leaf anywhere through the magazine . . . editorial material *everywhere* . . . front and back. No solid sections of advertising pages . . . newspaper-width editorial columns invite easy reading throughout.

We think you'll find the new "Executive Size" of CHEMICAL PROCESSING easier to read, more interesting. Don't you agree? We'll welcome your comments.

All Putman magazines now appear in this new "Executive Size" . . . FOOD PROCESSING, FOOD BUSINESS, INDUSTRY POWER, as well as CHEMICAL PROCESSING.

PUTMAN PUBLISHING COMPANY 111 E. DELAWARE PLACE • CHICAGO 11, ILLINOIS

NBP BPA *"Executive Magazines for Industry"*

Visit Us at the 26th Chemical Show, Coliseum, New York, December 2nd to 6th, 1957

Welcome to our gallery. The trade marks on display represent companies operating chemical plants designed by The Chemical & Industrial Corp. The plants furnished by C & I include nitric acid, ammonium nitrate solutions and solids, and complex fertilizer. Also available are plants for phosphoric, sulphuric, and concentrated nitric acid.

Illustrated brochures on request.

THE CHEMICAL AND INDUSTRIAL CORP.

CINCINNATI 26, OHIO

Designers and Constructors of Plants for the Processing of Ammonia • Available Throughout the World

6th, 1957

for Chemical Processing Advertisers*

The emblem at right is that of NBP—National Business Publications. You've probably seen it before on our contents page . . . rate card . . . or heading the CHEMICAL PROCESSING listing in Standard Rate & Data. Because we're proud of it.

It signifies that CHEMICAL PROCESSING has qualified for membership in the largest association of technical, scientific and professional journals in the United States. (We're proud, too, that our C. P. executive staff includes a past president of NBP and a member of its Board of Directors.)

But belonging to NBP is more than a feather in our publishing cap. It's an important *plus* for every advertiser in CHEMICAL PROCESSING. Here are the membership requirements. Judge for yourself:

- **Unbiased editorial content**
- **Periodic reader interest evaluation**
- **Non acceptance of questionable advertising**
- **Periodic audit of circulation**
- **Uniform rates to all advertisers**

In addition, NBP provides the framework for a continuing exchange of ideas among member publishers. The result: continuing improvement in publishing practices to make CHEMICAL PROCESSING more useful to its readers . . more productive for its advertisers.

NBP

NBP

Chemical Processing

For men who manage the Chemical Processing Industries

Published by Putman Publishing Company

Creators of PUTMAN-STYLE Magazines
. terse, vital editorial; "hand-picked" circulation; square, high-visibility format; quality readership; hence more READER ACTION

EPA NBP

PUTMAN PP PUBLISHING

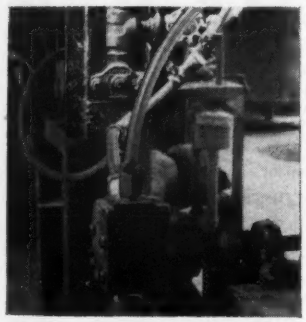
★ Courtesy of the publication MEDICAL ECONOMICS, creator of this copy, here adapted to CHEMICAL PROCESSING.

Breakdowns eliminated, leakage overcome with plastic pump

Conveys abrasive 30% slurry of ZrO_2

Problem: Repeated failures of conventional pumps occurred while conveying abrasive acidic 30% slurry of ZrO_2 at Zirconium Corporation of America, Solon, Ohio. Slurry was pumped at 80-135°F from settling cones to filters. Leakage eroded impellers, scored shafts, and caused equipment breakdown.

Solution: Sealless pump with plastic body block and synthetic rubber flexible liner was installed. Flanges on liner are pressed to body block by grooves on end plate and pedestal, isolating all mechanical parts to inside of flexible liner. Slurry is swept through channel formed between plastic body block and liner without touching any metallic parts.



Sealless pump has plastic body block and synthetic rubber flexible liner

Results: Pump proved to be impervious to ZrO_2 slurry. Production became continuous, and maintenance was reduced to easy and infrequent replacement of flexible liner.

(Sealless plastic pump is product of Vanton Pump & Equipment Corp., Div. of Cooper Alloy Corp., Dept. CP, 201 Sweetland Ave., Hillside, N.J. Check 5602 opp. last page.)

For more information on product discussed in preceding center spread, specify 5603 . . . see information request blank opposite last page.

TAKE A TIP FROM

ON HANDLING TOUGH CORROSIVES!

USE CHIKSAN LOADING ARMS

To maintain smooth production schedules, Eastman Kodak brings corrosive solvents and acids to its Rochester plant via truck from nearby tank farm storage. Corrosive action, however, was destroying loading hoses after comparatively short periods of use. To overcome this costly problem Kodak replaced its hoses with Chiksan Loading Arms. That was 10 years ago. Today, there are over 40 Chiksan Loading Arms in service at Kodak Park and not one record of product fatigue to date.

Whatever your fluid handling requirements, be it corrosive or other, insist on Chiksan Loading Arms—the time proven answer where the accent is on service, safety and speed.

There's a Chiksan Catalog waiting for you. Send for it today.

FOR CATALOG, WRITE DEPARTMENT 13-7

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

fmc CHIKSAN

CHIKSAN COMPANY—BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada, Ltd.

When inquiring check 5604 opposite last page

Consider FLINTKOTE's Protective Coatings For Insulation... to *trowel your troubles away!*

It is very costly to overlook effective insulation protection.

Make *sure* that the insulation on your refrigerated rooms, boiler walls, tanks and ducts is well protected against weather, condensation, fumes and moisture.

Chances are you'll find just the right answers to your insulation protection problems in Flintkote's wide line of cold-applied asphaltic cements and coatings—both emulsions and vapor-sealing cut-backs.

Whether your insulation is applied to retard heat loss or maintain low temperature by restricting infiltration of outside heat, it needs these Flintkote coatings to protect it from deterioration . . . and to help preserve your big fuel and power savings.

You can always count on Flintkote Protective Coatings. Look them up in Sweet's Files—and write us for specification data.

Over 50 Years' Specialized Experience At Your Service . . . by 'phone, mail or personal call. No obligation.

FLINTKOTE

THE FLINTKOTE COMPANY, Industrial Products Division, 30 Rockefeller Plaza, New York 20, N. Y.; 55th & Alameda Sts., Los Angeles 54, Calif.

The Flintkote Co. of Canada, Ltd.—Toronto, Ontario

When inquiring check 5605 opposite last page

NEW SOLUTIONS

Pump asks no favors, gives reliable service in adverse setup

Resists bleach, abrasion

Problem: Pump was required to circulate 250 gpm of room temperature bleach liquor against 83 ft discharge head at Lincoln, N.H., mill of Franconia Paper Corp. It had to resist chemical action of 2.5 to 3.5% (by weight) calcium hypochlorite solution as well as abrasion produced by undissolved hypochlorite crystals often present in liquor.

Solution: Company installed an Olivite® centrifugal pump for this service. Cast iron casing and cover of unit are lined with rubber-base compound that incorporates corrosion-resistant properties of rubber with high tensile strength. The 10¾"-diameter cast iron impeller is also covered with same material.

Pump has carbon mechanical shaft seal for tough service

Carbon mechanical shaft seal is simple but unique construction feature. Supplanting conventional packing, seal design provides positive means of preventing liquid from working back along shaft sleeve. It comprises cord reinforced rubber compression sleeve covering shaft sleeve and two carbon rings. One ring rotates, the other is stationary. No metal parts are used.

Result: Pump has been in continuous service for over two years. Operating under adverse conditions, unit has given excellent service. Seal has been trouble free.

(Olivite pump is product of Dorr-Oliver Inc., Barry Place, Stamford, Conn. . . . or for more information check 5606 opposite last page.)

HELP

for the man in the shredded work clothes

SAVE UP TO 93% in WORK CLOTHES COSTS

Under corrosive chemical conditions, **Worklon** industrial apparel of Orlon and Dynel **outlasted cotton and wool garments by 50 to 1!** If you're plagued by continual replacement of work clothes eaten away by punishing acids and chemicals, these facts are mighty important to you! Because Worklon work clothes resist punishing acids and caustics, they last so much longer and actually **cost far less.** Get the proof in Worklon's comprehensive new catalog and information book. Included are Worklon acid-resistant garments of 100% Orlon and 100% Dynel as well as **lint-free** apparel for superclean conditions.

WORKLON

ACID and CAUSTIC RESISTANT INDUSTRIAL APPAREL

of DuPont ORLON and Union Carbide DYNEL

SEND FOR NEW FREE CATALOG TODAY!

Worklon, Inc., Dept. CP-97
253 W. 28th St., New York 1, N.Y.

Please rush new Worklon catalog without cost or obligation.

name .....
address .....
city ..... zone .... state .....

When inquiring check 5607 opposite last page

Liquid air costs cut 79% with compact machine at Amperex

Gas liquefier saves company $9800/yr

Problem: Liquid air costs were excessive at Amperex Electronics Corporation, Hicksville, N.Y. Company required about 500 quarts per week, which it purchased at cost of 50c per quart. Records showed that evaporation losses during plant shutdown overnight and on weekends accounted for 100 quarts a week, or 20% of purchased supply. This amounted to an annual loss (50 week basis) of $2500.

Amperex uses liquid air to remove moisture from exhaust equipment used to produce vacuum in electronic tubes

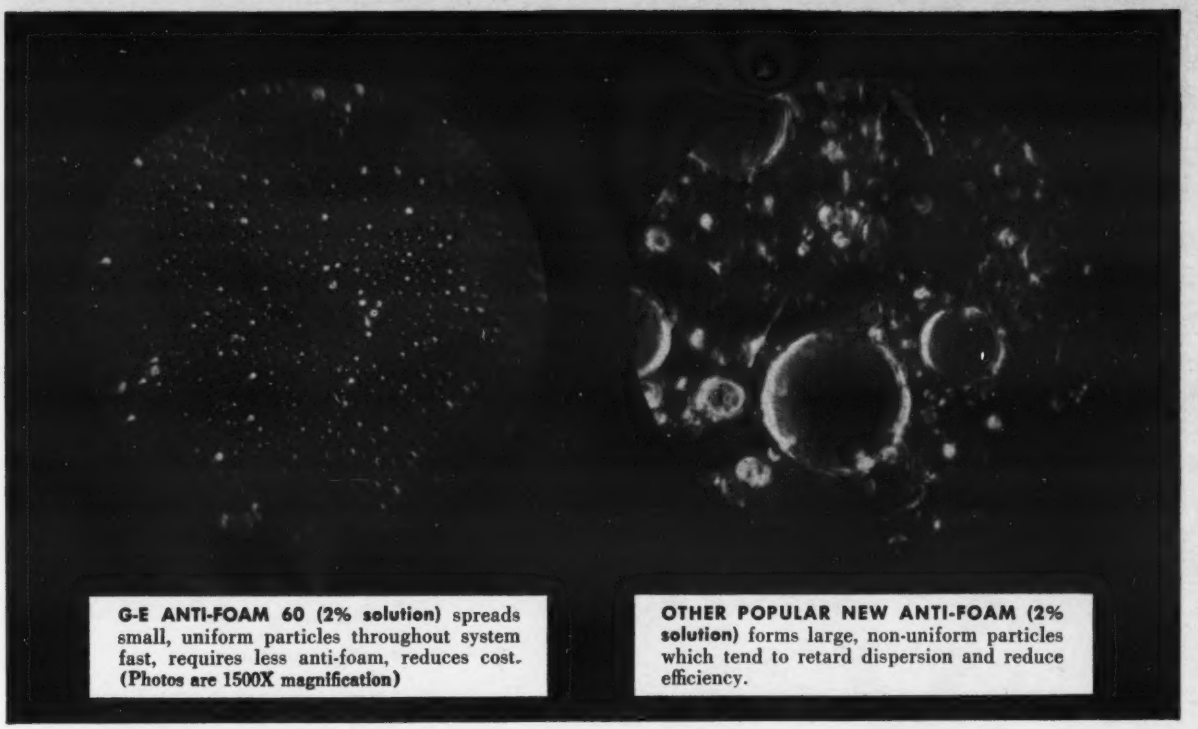
Compact machine (right) produces more than 5 quarts liquid air per hour

and for other purposes such as freezing rubber prior to machining operations.

Solution: Company installed a small gas liquefier, 37" long, 20" wide, and 34" high, capable of producing more than 5 quarts liquid air per hr (see CHEMICAL PROCESSING, Dec. 1956, pages 146-147). Unit is powered by a 10-hp motor and requires cooling water either from recirculating cooler or from city mains. Machine costs about $9000.

Results: After nearly a year of trouble-free operation with the unit, company estimates that it is saving 79% or a total of $9800 a year on the cost of liquid air. Here are the figures they cite:

Writing off capital outlay of machine over period of 10 years amounts to $900 annu-



G-E ANTI-FOAM 60 (2% solution) spreads small, uniform particles throughout system fast, requires less anti-foam, reduces cost. **(Photos are 1500X magnification)**

OTHER POPULAR NEW ANTI-FOAM (2% solution) forms large, non-uniform particles which tend to retard dispersion and reduce efficiency.

Micro-photographs show why . . .

G-E silicone Anti-foam 60 disperses faster, controls foam more economically

Rapid dispersion of small, uniform particles of anti-foam material is the key to fast, low-cost foam control. Here the performance of General Electric silicone Anti-foam 60 is outstanding. Anti-foam 60 disperses almost instantly into minute, uniform particles that destroy foam bubbles *fast*.

And with G-E Anti-foam 60 you get maximum benefit from silicone's inherent foam-destroying action, and get it *more economically* because only a few parts per million are needed in most foaming systems.

If defoaming can reduce your processing and filling time, eliminate costly boil-overs or increase your batch capacity (in aqueous systems), get a free test sample of General Electric Anti-foam 60 by mailing the coupon below. We think you will find, as many others have, that Anti-foam 60 is the most economical answer to your problems.

For non-aqueous systems—

G-E silicone fluids and compounds are also available for efficient low-cost defoaming of non-aqueous systems. Ask for free samples of SS-66 or SF-96.

SS-66 is a low-viscosity silicone anti-foam compound. Typical uses include defoaming during esterification of vegetable oils—as well as in paints, inks, antibiotic fermentation and phenolic resin cooking.

SF-96 fluids are available in standard viscosities from 40 to 100,000 centistokes for defoaming all hydrocarbons from light-end gasolines to heavy-end asphalts.

Mail this coupon for a free test sample:

Progress Is Our Most Important Product

GENERAL ELECTRIC

Silicone Products Dept.
Waterford, New York

Dept. A2G9, Silicone Products Department
General Electric Company, Waterford, New York

Please send me a sample of G-E Anti-foam

☐ AF-60 ☐ SS-66 ☐ SF-96

Application_____

Name_____ **Position**_____

Company_____

Street_____

City_____ **Zone**____ **State**_____

When inquiring check 5607A opposite last page

Ouija boards are passé

Time was, when a person had a question, out would come the ouija board for an answer. This wasn't too accurate a system, of course . . . but a lot of people put a lot of faith in what the ouija board told them.

Times change — and today accuracy is the keyword. That's why the modern business publication wants its circulation audited.

In joining BPA* CHEMICAL PROCESSING has taken an important step toward sound and accurate planning in your behalf. It means that we are checking, double-checking and constantly rechecking —

- **Who you are**
- **Where you work**
- **What your job is**

The Publisher wants and needs this information — and the BPA* audit can assure both him and his advertisers that he is getting his magazine into the hands of people *qualified by their common interests* to receive it. It helps him to give you —

- **Editorials that will *help you in your work***
- **Advertising that will *have value to you***

He can serve you even better if you will complete surveys and questionnaires which he may send you, and if you will give him your thoughts and opinions on the editorials and advertisements in his magazine.

You, the reader, are the *key person* to the publisher — and the BPA* audit helps him in his never-ending effort to think about you and design his magazine for you.

You, the reader, benefit when the circulation of CHEMICAL PROCESSING is audited by . . .

***BUSINESS PUBLICATIONS AUDIT OF CIRCULATION, INC.**
420 Lexington Avenue New York 17, N. Y.

BPA

A Non-Profit, Tripartite Membership Corporation of Advertisers, Advertising Agencies and Business Publications

ally. Another $800 is set aside for overhead, maintenance, and space cost during each 12 month period.

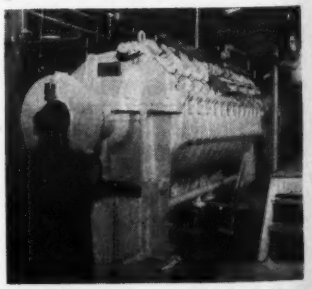
Machine operates about 16 hours per day, 5 days a week, a total of 4000 hours a year. Energy and water costs are figured at 25c per hour — a total annual expenditure of $1000. Adding these items, $900 plus $800 plus $1000, result is $2700 — 79% less than previous annual operating expense of $12,500 — and only $200 more than they used to lose on evaporation losses alone.

(Norelco gas liquefier is product of Instruments Division, North American Philips Company, Inc., Dept. CP, 750 S. Fulton Ave., Mount Vernon, N.Y. . . . or for more information check 5609 on the convenient Reader Service slip opposite last page.)

Assure iron-free caustic without solids using rotating-leaf filter

Service is maintenance-free and dependable

Clear, iron-free 50% NaOH without undesirable solids is assured at Frontier Chemical Co., Wichita, Kansas, by a rotating-leaf pressure filter. Filter removes iron, and any traces of NaCl carried over from manufacturing process, from caustic solution in this final polishing step prior to finished product storage. Storage tanks are lined to prevent iron pick-up after filtration.



CP Staff Photo

Operator washes down filter after running 15,000 gal batch of 50% NaOH. Unit assures iron- and solids-free product

Choice of unit was based on previous excellent experience with similar filters used in caustic service. Company expects at least four years of maintenance-free operation.

Filter is precoated with 50 lb of a cellulose material. A 15,000 gal batch of 50% caustic at 90°F is fed at 80 gpm. Batch also contains an admixture of precoat.

Operation of unit is as follows: A number of leaves covered with Monel filter fabrics are mounted on a rotating, horizontal, hollow filtrate shaft. Shaft and leaves are mounted inside a substantial, pressure-tight body. Unfiltered liquid under pressure fills entire body. Filtrate drains into hollow shaft, and suspended solids deposit on leaf surfaces. Rotation of leaves prevents settling and forming of heavy cake on any part. Coating on all surfaces is of an even thickness, insuring a rapid, balanced filtration.

Filter has 41 leaves, 738 sq ft of filter area, and 52 cu ft cake capacity. Overall dimensions are approximately 5′ wide, 6½′ high, and 17′ long.

(Vallez rotating-leaf filter is a product of Goslin-Birmingham Manufacturing Co., Inc., Dept. CP, Birmingham 1, Ala. . . . or for more information check 5610 on form opposite last page.)

FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

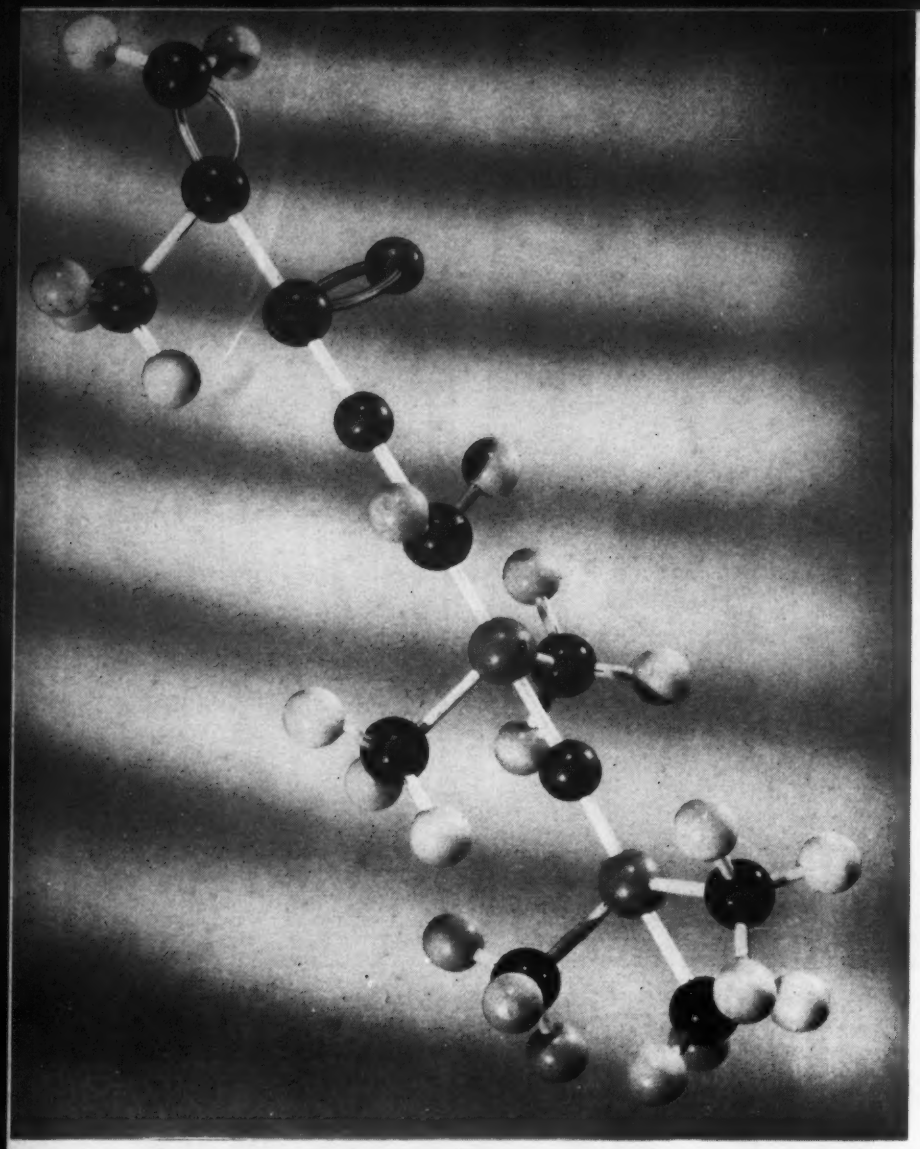
PACKAGING FLEXIBILITY PAYS OFF AT FEDERAL

A Lynch Robo-Lift elevating conveyor and a Lynch Robo-Wrap automatic unit packager combine to reach new production highs, lower packaging costs for the Federal Tool Corp., Chicago. Requiring but one operator, the integrated team produces an average of 45 packages a minute ... has the flexibility needed for quick changeover from one size to another. Manually fed, Robo-Lift takes the product "up 'n' over" for fast Robo-Wrap package forming, filling and sealing—all in one continuous action. The hard-working, Robo-Lift—Robo-Wrap team operates three shifts a day, six days a week... has logged just nine hours downtime in three months! Learn how Robo-Lift, Robo-Wrap packaging can serve you . . . bringing lower maintenance and operating costs, increased output. Used individually, Robo-Wrap and Robo-Lift can be integrated with your existing equipment. Write for full details. Address Department B.

LYNCH ROBO CORPORATION
A Division of LYNCH CORPORATION
Anderson, Indiana

FEDERAL TOOL ROBO-WRAPS PLASTIC ITEMS OF VARIOUS SIZES, SHAPES

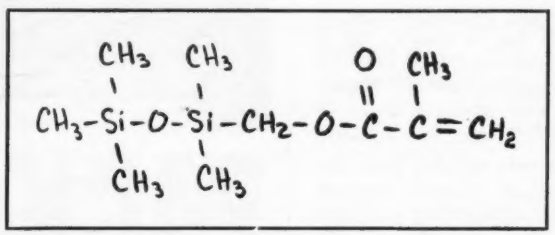
When inquiring check 5611 opposite last page



chemical materials

Organo-silicone can copolymerize — or act as chemical intermediate

Pentamethyldisiloxanemethyl methacrylate undergoes reactions of corresponding unsaturated organic esters



Syl-Kem 21 has two reactive double bonds in its makeup

Uses: For bulk, emulsion, or suspension copolymerization with conventional monomers to yield plastics with unusual properties. Compound may also be a chemical intermediate.

Features: Because of its double bonds, the compound offers tremendous possibilities in polymerizations. It has good reactivity and can be polymerized by conventional methods.

It is thought that compound will give pronounced effects when added in small amounts with certain polymers. Small additions may toughen final products, make them more slippery, and increase their water repellancy. Other uses may be to reduce melt viscosities of hard-to-mold high-mw polymers, reduce blush tendencies, and even modify existing silicone products.

Description: Chemically, pentamethyldisiloxanemethyl methacrylate, Syl-Kem 21 has the structure shown. A clear liquid, it is soluble in hydrocarbons, ethers, alcohols, methyl methacrylate, styrene, and acrylonitrile.

Preliminary tests indicate that the chemical undergoes the typical reactions of corresponding unsaturated organic esters. Whenever strongly alkaline or acid catalysts are required, some siloxane rearrangement takes place.

Studies with methyl methacrylate, styrene, acrylonitrile, and vinyl acetate indicate that the polymerization rate and copolymerization behavior of this organo-silicone is nearly identical to that of methyl methacrylate.

The compound boils at 86.5°C (@ 10 mm Hg), and at 25°C has a density of 0.903 and a refractive index of 1.4202.

Manufacturer is continuing work with this compound, but doesn't plan large-scale research. They plan to wait about two years to see if industrial acceptance confirms their belief that the possibilities for the compound are tremendous. If so, other organo-silicone compounds may be introduced. Right now, compound is strictly an experimental item.

(Syl-Kem 21 is a product of Dow Corning Corp., Dept. CP, Midland, Mich. Check 5612 on form opposite last page.)

Economical antifoam won't polymerize on paper press

Uses: For control of foam in paper mill systems.

Features: Economical product will not polymerize on press or couch rolls. This eliminates necessity of rebuilding rolls.

Description: Water-base, paste-type antifoam is effective under pH conditions as low as two or as high as twelve. It is also effective through an extremely wide range of temperatures. Foam at screens and cylinder vats is eliminated even when product is applied as far ahead as thickeners.

Antifoam is blend of anionic and nonionic surface-active agents. It is normally applied as water emulsion.

(Nalco 72 is product of National Aluminate Corp., Dept. CP, 6216 W. 66th Place, Chicago 38, Ill. . . . or for more information check 5613 on form opposite last page.)

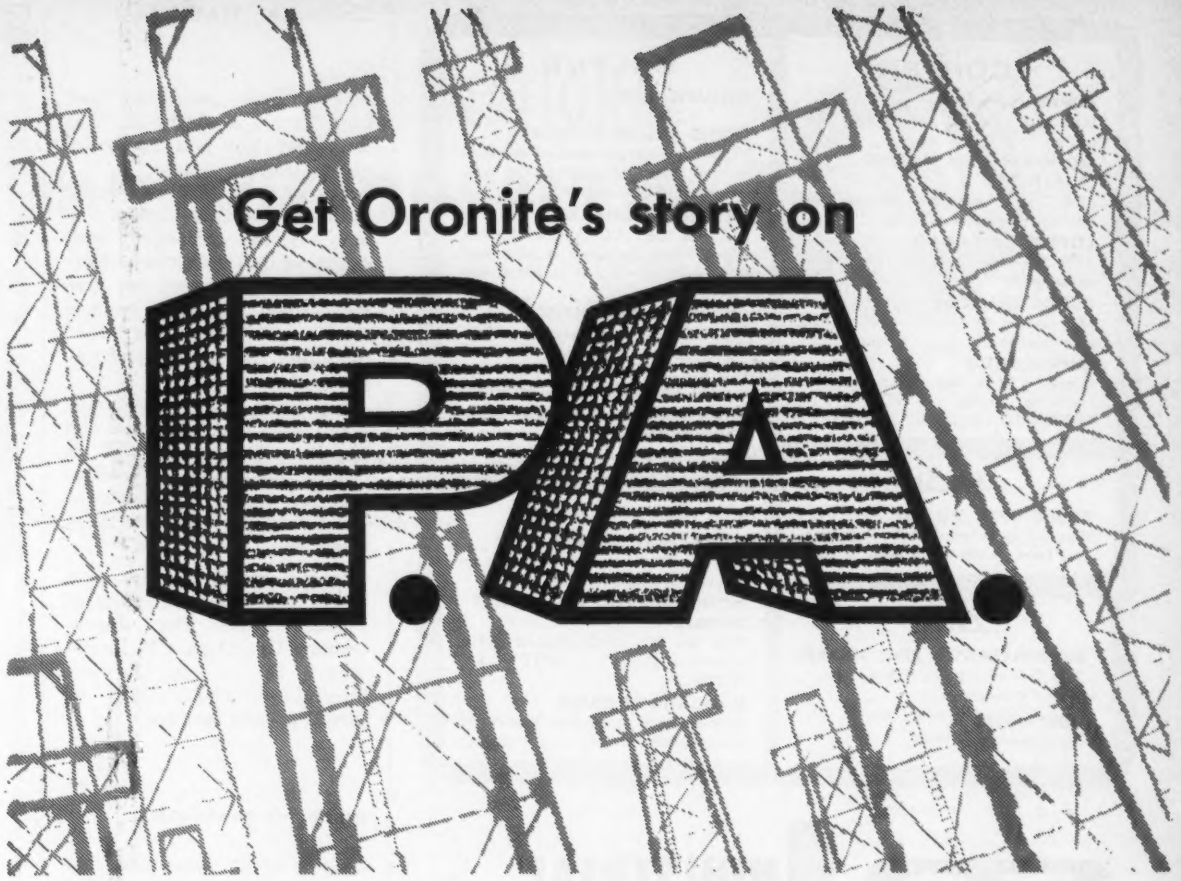
Develops quintet of amine agents to cure epoxies

Five curing agents for use with epoxy resins (such as Epi-Rez 510) are now available, and have these characteristics:

Epi-Cure 82 — This modified amine-type, general purpose curing agent for epoxy resins has lower vapor pressure than conventional aliphatic polyamines. It also has a more convenient mixing ratio and gives improved physical properties for room-temp cured products. Agent is highly reactive.

Epi-Cure 83 — A mild, amine-type agent with very low reactivity, this product is designed for curing large masses of resin without producing an excessive exotherm. Pot life is one to two days at room temp. It can be blended with Epi-Cure 82 to give tailor-made reactivity.

Epi-Cure 84 — This is a liquid curing agent based on aromatic amines. It gives ex-



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Increased manufacturing facilities. Recently expanded production assures you phthalic anhydride of highest quality when you need it.

New, large storage facilities. Quick delivery of product from storage terminals in close-by Eastern centers to serve you better. Also available in molten form.

Have you investigated ISOPHTHALIC?

This new Oronite raw material makes possible lower cost resins that out-perform higher cost resins. It has already provided many companies with new or improved protective coating products. For complete information on Oronite Phthalic Anhydride or Isophthalic—contact the Oronite office nearest you.

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When inquiring check 5614 opposite last page

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Industrial Crystals and all common grades.

MONOHYDRATED COPPER SULFATE
35% Copper as metallic packaged in steel drums at no extra cost.

COPPER CARBONATE
55% Copper as metallic. Light and dense grades.

CUPRIC CHLORIDE
37% Copper as metallic. Available in polethylene-lined drums or bags.

CUPRIC OXIDE
Minimum 76% Copper as metallic. Technical grade . . . NOT A BY-PRODUCT.

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Highest commercial quality, available in tank cars, tank wagons, ton cylinders and 150-lb. cylinders.

CHLOROSULFONIC ACID
Iron less than 1.0 ppm as loaded. Water white. Delivered in glass-lined tank wagons, also in stainless steel drums.

SODIUM HYDROSULFITE
T-C HYDRO is a dry, white, free flowing, crystalline powder of uniform particle size and structure. It is dust free, assuring highest stability and uniformity.

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Other organic Sulfonic Acids.

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Partially hydrated, free flowing granular form. Available in bags or bulk.

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65% Mn SO_4. Designed specifically for inclusion in mixed fertilizer.

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93% Mn SO_4, H_2O. Highest purity, technical grade . . . NOT A BY-PRODUCT.

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Minimum 48% Manganese as metallic. Feeds, fertilizers, spray or dust grades.

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MONOHYDRATED ZINC SULFATE
36% Zinc as metallic. White, free flowing powder.

ZINC OXIDE
Secondary Zinc Oxide.

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We mine Copper, Sulfur, Iron and Zinc and are basic producers of their chemical derivatives. Our technical know-how and basic position in these minerals is your assurance of exacting quality control, strict uniform consistency and a plentiful supply.

Samples, specifications and detailed information available upon request.

TENNESSEE CORPORATION

617-29 Grant Building, Atlanta, Georgia

When inquiring check 5615 opposite last page

cellent heat resistance and high-temp strength. It has long pot life and moderate curing cycles.

Epi-Cure 85 — Resins cured with this modified amine are very flexible. Blended with other amines (such as Epi-Cure 82), this agent can give room-temp curing systems that impart various degrees of flexibility. Agent has low vapor pressure.

Epi-Cure 86 — This curing agent gives good electrical and physical properties and is readily adaptable to production-line techniques which require a long pot life but relatively short cure times.

(Curing agents for use with epoxy resins are products of Plastics Resins Div., Jones-Dabney Co., Dept. CP, Louisville 8, Ky. . . . or for more information check 5616 on form opposite last page.)

Inorganic chemicals

Catalog of 12 pages describes properties, applications of manufacturer's inorganic chemicals and refrigerants. Included are boron, sodium, potassium, bromine, and lithium. Products catalog—American Potash & Chemical Corp., Dept. CP, 3030 W. 6th St., Los Angeles 54, Calif. Check 5617.

". . . and furthermore,

$$P = \frac{PI^2 - POP^2}{2PI - PO - P_2} = PO + \frac{(PI - PO)^2}{2PI - PO - P_2} \ldots$$

Mono Oleates Di

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Diglycol
Ethylene Glycol
Diethylene Glycol
Polyethylene Glycol
Propylene Glycol
Polyoxyethylene
Butoxyethyl
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When inquiring check 5618 opposite last page

Emulsifier for pesticides works especially good in high-K fertilizers

Uses: In formulating emulsifiable pesticide concentrates to be used in high potash fertilizer solutions.

Features: Agent facilitates field mixing of pesticides with liquid fertilizers.

Description: Emulsifier is an extension of manufacturer's H-A and H-B emulsifiers.

(Emcol H-C is a product of Emulsol Chemical Corp., Dept. CP, 75 E. Wacker Dr., Chicago 1, Ill. Check 5619 on form opposite last page.)

Gives superior adhesion to plastisol coatings applied on metals

Clear primer is available

Clear, white, and yellow primers give superior adhesion of plastisols to metal when either air dried or baked. These are:

Clear — (69X-1406) For use where a colored prime coat would be visible and be objectionable, or might affect the plastisol color.

White — (67X-832) Its color assures 100% coverage. Is recommended for good hot water and humidity resistance.

Yellow — (66X-5457) Use where resistance to corrosion and corrosion creep are important.

(Plastisol primers are products of The Stanley Chemical Co., Dept. CP, East Berlin, Conn. Check 5620 on form opposite last page.)

Epoxy know-how

Epoxy resin compounds designed for electronics industry are discussed in 28-page booklet. Physical and electrical properties for nine potting resins, as well as graphs of properties of more than forty different Epoxylite compounds and curing agents are featured. Research report 57-100 — The Epoxylite Corp., Dept. CP, 10829 East Central Ave., El Monte, Calif. Check 5621.

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MAGNESIUM OXIDE 99.0+%

In the highest purity ever produced in carload quantities and in the low price range

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- **IN HIGH TEMPERATURE HEATING ELEMENTS**
- **AS A PRECIPITANT OF YELLOW CAKE IN URANIUM ORE TREATMENT MILLS**
- **IN PRODUCTION OF HIGH-MELTING-POINT REFRACTORY BRICKS**

International's research staff is prepared to give you technical assistance in the study of end use problems. Please use the coupon in requesting samples and more information.

chemical specifications

chemical		purity range
MAGNESIUM OXIDE	MgO	99.00 – 99.80%
IRON	Fe_2O_3	0.04 – 0.06
LIME	CaO	0.07 – 0.08
SILICA	SiO_2	0.05 – 0.10
ALUMINA	Al_2O_3	0.04 – 0.09
BORON	B_2O_3	0.003 – 0.01
CHLORIDE	Cl	0.02 – 0.04
SULFATE	SO_4	0.03 – 0.05
SODIUM AND POTASSIUM	Na+K	0.02 – 0.04
LOSS ON IGNITION		0.20 – 0.30

physical specifications
(Color . . . White)

PELLETS
Approx. ⅛" x ⅜", plus 12 mesh
Bulk density: 60 lb. cu. ft.

GRANULAR
All minus 12 mesh
Bulk density: 70 lb. cu. ft.

POWDERED
100% minus 200 mesh
90%+ minus 325 mesh
Bulk density: 80 lb. cu. ft.

shipments

Bulk in box cars and covered hopper bottom cars, minimum 30 tons net.

80 lb. net multi-ply paper bags with moisture resistant barriers and 100 lb. net fiber drums for carload, truckload and L.C.L. deliveries.

All shipments F.O.B. Carlsbad, New Mexico.

Direct truck service to all points in the Colorado plateau on 24 hours' notice.

price range

International MgO prices range from $110 to $250 per ton, F.O.B. Carlsbad, depending on grade, packaging and quantity.

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Hydrofluosilicic Acid	

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☐ Please send Magnesium Oxide Brochure
My field of interest for MgO is _____

Name _____

Firm _____

Address _____

City _____ State _____

When inquiring check 5622 opposite last page

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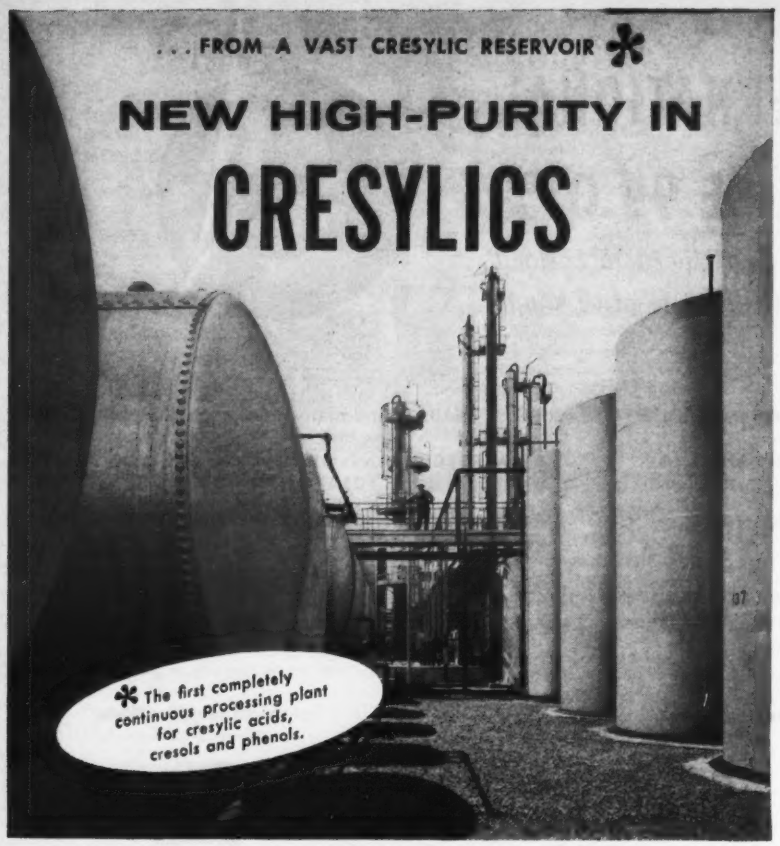
NEW HIGH-PURITY IN CRESYLICS



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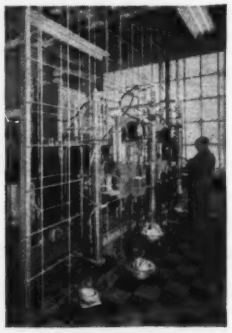

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When inquiring check 5623 opposite last page

CHEMICAL MATERIALS

No polymeric build-up of oxide in hydroxypropylglycerine

Plasticizer is OK for food packaging and products

Uses: As plasticizer for cellulosics, glue, starch, dextrin, cork products, phenol-formaldehyde resins; and in making alkyd resins and polyesters.

Features: Process for making hydroxypropylglycerine does not give any polymeric build-up of propylene oxide. Material is less volatile than glycerine and has greater permanence on aging. It is also less hygroscopic than glycerine. It is suitable for use in food packaging and products.

Description: Hydroxypropylglycerine is viscous, yellowish-amber liquid prepared by reaction of glycerine and propylene oxide. Compound has an average hydroxypropyl substitution of 2.5. Specs are:

APHA color (max)	300
Viscosity (25°C, Cps)	450-1000
Sp gr (25/25°C)	1.07-1.10

(Hyprin GP25 is product of The Dow Chemical Co., Midland, Mich. . . . or for more information check 5624 on form opposite last page.)

Viscosity conversion

Wall chart, 12x18", gives conversion from 63 mediums into poises. Range is 0.10 to 5000 poises and is for use with nitrocellulose-base solutions. Chart — Cellofilm Industries, Inc., Dept. CP, Woodridge, N.J. Check 5625.

It's 'the most' in reactivity of phenol formaldahyde reaction products

Trimethylolphenol is good cross-linker

Uses: Has broad potential for use in coatings, adhesives, impregnations, plastic alloys, other chemical compositions.

Features: Chemical represents ultimate in reactivity for phenol formaldahyde reaction

Excerpts From The Chemical Hall of FAME

Paul Sabatier
(1854-1941)

In 1915 Sabatier was awarded the Nobel prize for the numerous hydrogenation experiments which he carried out. Originally interested in physical chemistry, he later had such famous students as Senderens, Mailhe, and Murat.

40 years ago Foremost's El Dorado Division had been experts in coconut oil and its by-products for more than 20 years. Later they turned an equally expert eye on the production of fatty acids and methyl esters.

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Fatty Acids
Caprylic Eldhyco* Capric
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Methyl Esters
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Laurate Coconate
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For Example: **ELDO CAPRIC ACID**
94-97% pure. (Purest Capric Acid commercially produced.) Readily available at an attractive price. Eldo's high standards give you a better, more uniform end product.

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In Chicago: M. B. Sweet Co.
In Cincinnati: Howard Dock
In Cleveland: F. W. Kamin Co.

When inquiring check 5626 opposite last page

products. It is a cross-linking agent for compounds or polymers containing "active" hydrogen.

Description: Trimethylolphenol is 70% aqueous solution, dark red in color. Viscosity is 50 to 70 centistokes at 25°C.

Solution will react as one-step phenolic resin, slowly converting to resin at room temperature. In range of 150 to 160°C it will harden in 80 to 100 seconds. Reaction may be catalyzed by certain acids.

(BRLA 1030 is product of Bakelite Co., Div. of Union Carbide Corp., Dept. CP, 260 Madison Ave., New York 16, N. Y. Check 5627.

Heat, light stability, low sulfur stain at low cost

Stabilizer offers good clarity and color retention

Uses: As stabilizer for polyvinyl chloride plastics.

Features: Solution provides superior heat and light stability, and low sulfur-stain potential at low cost. It offers good clarity throughout processing cycle, and excellent color retention in pigmented stocks.

Description: Stabilizer is mild, low-odor, yellow, liquid solution of barium and cadmium compounds.

(Stabilizer 1212-A is product of Ferro Chemical Corp., Dept. CP, Bedford, Ohio. . . . or for more information check 5628 on form which is located opposite last page.)

Dimensional stabilization of paper and prints

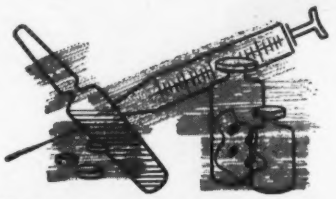
How to make non-curl photo prints and dimensionally stabilized paper with polyethylene glycol dicarboxylic resin compounds are described in two bulletins. Bul FL 1-42 (Non-curl Photo Prints) and Bul TP-247 (Dimensional Stabilization of Paper) — The Upson Chemical Corp., Dept. CP, 80 Stevens St., Lockport, N.Y. Check 5629.

Which New CO_2 Application Will Help You Most?

"CO_2 applications are unlimited"... a broad statement, but literally true. New ways in which this most versatile of all gases is improving products, cutting costs and saving time and labor are being developed almost daily. Some of the applications discussed here will be of direct, primary interest to you. Other uses, while perhaps not in your immediate specialty, may well be *adaptable* to your field. Check the box by each application on which you'd like detailed, technical data and mail this page to:

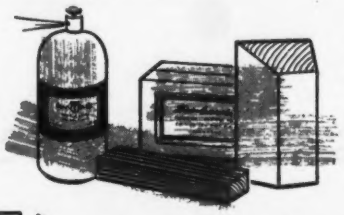
The Liquid Carbonic Corporation • CO_2 Division
3100 South Kedzie Avenue • Chicago 23

Your inquiry will receive prompt, professional attention from the chemical applications staff of the world's largest producer of CO_2.



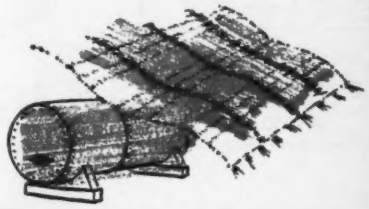
☐ ▶ **Economical, Efficient "Freeze-Drying"**—Freeze-drying is used to dehydrate heat sensitive substances at low temperatures. In the processing of blood plasma and the manufacture of penicillin, streptomycin and other pharmaceuticals, dry ice or liquid CO_2 is used to freeze the item being dried. Also, during the drying stage, dry ice is used to condense the moisture as it is sublimed under vacuum. Capable of quickly attaining and maintaining the extreme low temperatures required, CO_2 has the added advantage of requiring only a small capital outlay.

☐ ▶ **Precipitation of Carbonates**—Carbon dioxide in its gaseous form is used to precipitate carbonates from water solutions. Ammonium bicarbonate and lead carbonate are examples. Bakeries and plastics manufacturers are among the many users of ammonium bicarbonate.



☐ ▶ **Simplifies Pulverizing of Materials With Low Melting Point**—Many substances tend to melt or smear because of the heat generated in a milling process. DDT and vegetable fat flakes which are waxy and Teflon resin which is very tough and elastic are examples. In the low temperature pulverizing process the ingredient is mixed with crushed dry ice or low pressure carbon dioxide liquid is injected directly into the ingredient. These methods effectively inhibit the melting or smearing, prevents plugging and reduces horse power requirements. Gaseous carbon dioxide is also used to form an atmospheric "blanket" to effectively prevent fire during the grinding of flammable materials. An example of this application is the grinding of phosphorus pentasulphide and flammable resin materials.

☐ ▶ **Fireproof "Blanket" For Stored Phenol**—Phenol is a toxic, corrosive, flammable compound and is stored in an inert atmosphere under slight pressure to reduce vaporization, prevent oxidation and at the same time provide a non-flammable atmosphere. Carbon dioxide is also used as a pressure medium in transferring liquid phenol.



☐ ▶ **Effective Inerting Agent**—There are many times when an inert atmosphere is needed to prevent fire or explosion. Before welding a tank that has been used for the storage of flammable liquid, CO_2 is used to inert the atmosphere in the tank so that welding can be done with no danger of explosion. CO_2, acting as an effective atmospheric "blanket," also prevents oxidation and "skinning" of paints and oils.

SEND IN THIS PAGE FOR COMPLETE INFORMATION

Check off the applications which interest you, fill in the mailing information below, and mail this page to The Liquid Carbonic Corporation for prompt information. You'll also receive a free copy of our Booklet "Applications Unlimited," which covers dozens of other important uses for CO_2.

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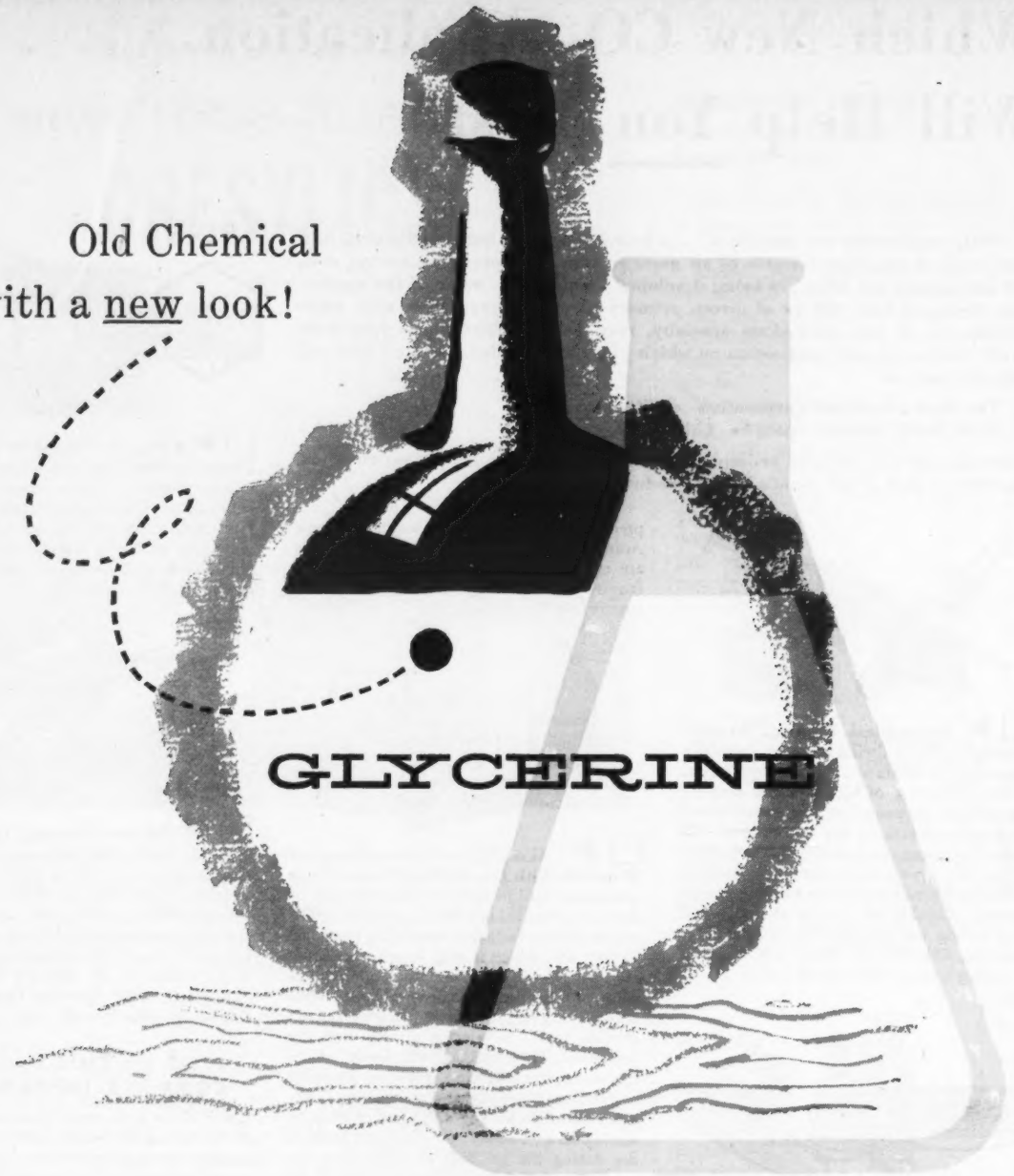
When inquiring check 5630 opposite last page



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IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited • Montreal • Toronto • Vancouver

When inquiring check 5631 opposite last page

Peroxidase acts directly on hydrogen peroxide

Uses: For applications in bleaching, sterilization, blowing porous materials, supplying free oxygen, preventing radiation damage, organic synthesis, and as an antioxidant.

Features: Peroxidase will not act directly on peroxygen compounds other than hydrogen peroxide, but is effective against peroxygen compounds, such as perborate, that hydrolyze in aqueous solution to yield hydrogen peroxide.

Description: Special type of peroxidase is clear, concentrated, aqueous preparation of the enzyme catalase derived from plant source (a mold). It has wider range of pH and temperature for activity than catalases derived from animal organs. It is very stable at elevated temperatures, and will withstand 70°C for 30 minutes, with no loss in potency in absence of hydrogen peroxide.

(Catalase FC is product of Fermco Chemicals, Inc., Dept. CP, 4941 S. Racine Ave., Chicago 9, Ill. . . . or for more information check 5632 on form opposite last page.)

95% dicyclopentadiene combines with aldehydes and unsaturates

Lends itself to production of ketones, fulvenes, oximes

Uses: For making insecticides, printing inks, resins, drying oils, and other chemical products.

Features: Material combines easily with large variety of unsaturated acids and aldehydes to form cyclic and bicyclic compounds. It also lends itself to production of ketone, fulvenes, and oximes.

Description: Dicyclopentadiene is available in purity of at least 95%, and comes either in drums or tank-car lots.

(Dicyclopentadiene is available from The Enjay Company, Inc., Dept. CP, 15 W. 51st St., New York 19, N.Y. . . . or for more information check 5633 opp. last page.)

LITHIUM PRODUCT DATA

LITHIUM CORPORATION OF AMERICA, INC.

2535 RAND TOWER MINNEAPOLIS 2, MINNESOTA

PRODUCT	PROPERTIES	USES
Lithium Metal Li Purity: Typical Lithium content: 99.8% Also Available: **Lithium Metal** (Low Sodium Content) 0.005% Na Max.	Atomic Weight: 6.940. Density: 0.53 gm/cm^3. Melting Point: 180.5°C, 365.0°F. Boiling Point: 1317°C, 2403°F. Hardness, Mohs' Scale: 0.6. Heat of Fusion: 103 cal/gm. Heat of Vaporization: 4680 cal/gm. Heat Capacity: 0.85 cal/gm/°C at 25°C.	Metallurgy: Deoxidizer, desulfurizer and degasifier in metal melts. Self-fluxing brazing alloys. Hardening agent in bearing metal alloys. Organic Chemistry: Lithium alkyls and aryls in organic synthesis. Reducing agent. Chemical Manufacturing: Starting material in production of lithium hydride and lithium amide. Nucleonics: Fusion reactions. Heat transfer. Analytical Chemistry: Removal of nitrogen from inert gases. Pharmaceutical: Synthesis of Vitamin A.
Lithium Metal Dispersions	Dispersing Media: Dodecane, diisopropylbenzene, mineral oil, petrolatum, paraffin wax. Particle Size: Over 90% under 25 microns.	Catalysis: Used to catalyze the polymerization of isoprene to a synthetic rubber closely resembling natural rubber. Organic Chemistry: Lithium alkyls and aryls in organic synthesis.
Lithium Metal Cartridges	Form: Lithium metal hermetically-sealed in copper tubing: 2.25, 4.50 & 9.0 gram charge. Hermetically-sealed in copper cup: 108.0 gram charge. Hermetically-sealed in aluminum tubing: 2.25, 4.50 & 9.0 gram charge.	General purifying agent in metal melts.
Lithium Chloride LiCl Grade: Technical Anhydrous salt and brine.	Molecular Weight: 42.40. Color & Form: White, hygroscopic, granular powder. Density: 2.068 gm/cm^3 at 25°C. Melting Point: 608°C. Boiling Point: 1382°C. Specific Heat: 0.288 cal./gm./°C. at 25°C. Heat of Formation: 97.70 kilocal./gm. mol. at 25°C. Heat of Solution: 8.49 kilocal./gm. mol. (200 mols. H_2O/mol. LiCl). Solubility: Moderately soluble in organic solvents such as alcohols, aldehydes, ketones, esters, pyridine, ethylenediamine, etc.	Air conditioning: Used as a brine in dehumidification systems. Metallurgy: Flux component for brazing aluminum, magnesium, zirconium, titanium and their alloys. Electrolytic preparation of lithium and other metals. Heat treating. Dry Cells: Additive to the electrolyte of dry cells for low temperature use. Organic reactions: Catalyst. Drying Agent. Prevention of frost formation. Fire Extinguishers: As a non-freezing brine. Atomic Energy: Removal of fission products.
Lithium Fluoride LiF Grade: Technical Anhydrous	Molecular Weight: 25.94. Color & Form: Fine, white powder. Density: 2.640 gm/cm^3 at 25°C. Melting Point: 848°C. Boiling Point: 1681°C. Solubility: Slightly soluble in water; insoluble in alcohol.	Metallurgy: Component in welding and soldering fluxes. Ceramics. Optics: Synthetic crystals in infra-red and ultra-violet instruments.

For more information on product at right, specify 5634 see information request blank opposite last page.

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When inquiring check 5635 opposite last page

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Soft amorphous type with these special features

OIL ABSORPTION (G & C)..... 36.4 to 40.3 LBS.

pH VALUE..... 5.0 to 5.2

MOISTURE..... 0.5%

A NEW PROCESS SILICA

PARTICLE SIZE RANGE 1 TO 15 MICRONS

90% MINUS 10 MICRONS

New improved equipment assures highest quality and production control

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When inquiring check 5636 opposite last page

Ion-exchangers derived from cellulose give efficient separation of many protein

Ion-exchangers made from cellulose have been found to be very good in separating complex proteins which could be easily torn apart. Protein molecules are very large compared to metal ions and require an ion-exchanger with extensive surface area for efficient separation.

Finely divided cellulose made from wood pulp has some ion-exchange properties due to a small amount of carboxyl groups which are picked up during processing. It has recently been found that by adding additional reactive groups to the cellulose, these ion-exchange properties can be tremendously enhanced. Pioneers in this field are Doctors H. A. Sober and E. A. Peterson of the National Cancer Institute in Bethesda, Maryland.

They, and a number of other scientists, have found that ion-exchangers derived from cellulose have properties that are not possessed by any currently available resinous ion-exchanger.

Complex proteins, such as hormones or enzymes, are very easily denatured (altered in properties) if adsorption or desorption conditions are anything but gentle. In spite of the high capacity of cellulose-derived ion-exchangers for adsorption of proteins, elution may be carried out under very mild conditions to prevent denaturation — a small pH change is sufficient.

Furthermore, protein molecules are so large that they cannot penetrate into the adsorbent particle and therefore collect only on the surface of the ion-exchanger. Finely divided cellulose with its extremely large surface area allows the attainment of reasonable capacity.

The protein molecule can be compared to a fat rubber band, with the conventional polyvalent metal ion — to roughly the same scale — looking like a BB-shot. That's why it requires an ion-exchanger with special characteristics.

Applications

Cellulose-derived ion-exchangers are well suited for isolation and purification of proteins and nucleic acids. The pharmaceutical industry may find it an economical path to fractionate certain products, such as penicillins and

Properties of Lab-Grade DEAE-Cellulose

	Type 20	Type 40	Type 100
Apparent Density (gm/ml)	0.14	0.20	0.39
Screen Analysis			
on 70 mesh	1	1	1
on 100 mesh	6	3	3
on 200 mesh	23	25	20
thru 200 mesh	70	71	76
Specific Volume (ml/gm when water-wet)	11.4	9.9	5.9
Flow Rate of Water through Exchanger	Greatest	Intermediate	Least
Exchange Capacity meq/gm)	0.5-0.8	0.5-0.8	0.5-0.8

various blood fractions.

Concerns that handle large volumes of protein — such as meat packers — may find these exchangers to be a means of salvaging some of the water-soluble proteins which they now find unrecoverable.

It is possible that some of the cellulose derivatives could be used in filtering solutions, both as a filter aid and to remove unwanted proteins at the same time. Another possibility is to use the cellulose derivative to adsorb a growth hormone, and then adding it to animal feeds.

Types

The most extensively investigated cellulose derivative called DEAE-cellulose, an anion exchanger containing diethylaminoethyl groups attached to cellulose. A cation exchanger, CM-cellulose, is also available. This contains carboxymethyl groups attached to cellulose. Another derivative is ECTEOLA-cellulose. This is a compound of cellulose, epichlorohydrin, and triethanolamine.

Properties

The physical properties and chemical stability of the cellulose derivatives make them well suited to column ion-exchange operation. Currently available DEAE-cellulose has a capacity of 0.55 to 0.75 milliequivalent per gram.

Although much lower than the capacity of most resinous exchangers, it is not low in terms of the weight of protein adsorbed per gram of DEAE-cellulose because the molecular weight of proteins is so high. Dr. Sober reports that "loads as high as 170 mg protein per gram of adsorbent could be chromatographed with good resolution." This amounts to 17% protein on the weight of the adsorbent.

DEAE—cellulose is a dry, powdered solid. Three types are available — 20, 40, and 100. Type 20 is most bulky, but offers the least resistance to liquids when packed in a column. Properties are shown

Turn to next page

EXON 480 ... specifically for (tone perfect) phonograph records

typical of the Pin-Pointed Qualities in Exon Vinyl resins

These "biscuits" are compounded of Exon 480, the vinyl resin created specifically for phonograph records. With each, you get a finished recording of high tonal quality and breakage resistance.

Exon 480 combines many production advantages in the blending, fusing, preforming and molding processes. For instance, here's one production economy: Exon 480's higher bulking density speeds banbury output as much as 25%.

You also get high thermoplasticity, good heat and light stability, plus compatibility with the vinyl plasticizers, stabilizers and pigments most often used. No wonder so many record makers specify Exon 480 for better "biscuits" every time. Another example of how Exon's Pin-Pointed Properties match your particular needs.

Exon 480 is just one of the many fine resins in industry's most complete line of versatile vinyls. It is another reason why industry looks to Firestone Exon for engineered answers to its needs.

Consider your own production or product problem. Then, for resin properties pin-pointed to the best answer for you, check with Firestone.

Firestone EXON RESINS

For complete information and technical service, call or write:

CHEMICAL SALES DIVISION: FIRESTONE PLASTICS COMPANY

DEPT. 78L, POTTSTOWN, PA. • A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

IN CANADA, CONTACT CHEMICAL SALES DIVISION, FIRESTONE TIRE AND RUBBER COMPANY OF CANADA LTD., HAMILTON, ONT.

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

When inquiring check 5637 opposite last page

Adhesive Manufacturing Problems?

Call COLTON for the right raw materials

It will pay you to check these Colton resins and their uses:

Colton **Vinol** POLYVINYL ALCOHOL for ADHESIVES and COATINGS.

Colton **Vinac** and **Flexbond** POLYVINYL ACETATE EMULSIONS for ADHESIVES and COATINGS.

Colton **Vinac** POLYVINYL ACETATE BEADS (Acetate in Solid Form) for ADHESIVES, COATINGS, SATURANTS, HOT MELTS and HEAT SEALS.

Colton Chemical Company—pioneering and long-established source of polymer resins—is recognized by adhesive manufacturers as *the* basic supplier of the right raw materials.

You get the best in service and the most out of your products in quality, sales and profits when you come to Colton.

Call on Colton representatives now for samples and recommendations. Address Dept. A32.

Also consult Colton if you have problems in chemicals involving Textiles, Paints, Leather, Paper and Inks.

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Sales Offices and Warehouse Facilities Throughout U. S. • Export: Airco Company International, New York 17, N. Y.

When inquiring check 5638 opposite last page

Ion-Exchangers

Starts on page 136

in the accompanying table.

Cellulose exchangers can be used repeatedly just as are resinous exchangers. They can be stored indefinitely in the dry state. It is reported that many months of storage in a cold room in contact with solutions ranging from 0.05M NaH_2PO_4 to 1N NaOH did not cause deterioration.

Laboratory grade DEAE-cellulose costs $30 a pound at present, but when enlarged facilities are placed in operation this month, price should be reduced and a greater variety of derivatives should be available. CM-cellulose and ECTEOLA-cellulose can be supplied at the present time on special order.

(Cellulose derivative ion-exchangers are products of the Brown Co., Dept. CP, Berlin, N. H. . . . or check 5639 opposite last page.)

Textile finishing

Polyvinyl acetate emulsions for textile finishing is contained in 12-page technical manual. Properties of various emulsions, compounding, and application techniques are included. Bul GT 101-57—Shawinigan Resins Corp., Dept. CP, Springfield 2, Mass. Check 5640.

". . . looks like now we've been completely replaced."

F FLEXIBLE TUBING *made from* TEFLON *does this important job*

F flexible tubing of Teflon* is being used to connect deionized water to a lead pot in the application shown here. This tubing material was chosen for 4 important reasons:

1. Its translucency shows fluid flow
2. Its flexibility allows easy installation
3. The high service temperature of Teflon* resists the high heat near the lead pot
4. The purity of Teflon* prevents the contamination of the deionized water

Standard stainless steel fittings make the assembly to standard equipment easy and PF flexible tubing of Teflon* is easily and economically taped into position.

Write, wire or call for complete details on the unique physical properties of PF flexible or spaghetti tubing that will solve your difficult application problems.

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PHOTO COURTESY OF ATLANTIC REFINING

* TEFLON DuPont trade name for Tetrafluoroethylene resin

When inquiring check 5641 opposite last page

Offers enamel makers quick baking, high gloss

Resin has improved hardness, adhesion, resistance

Uses: For white baking enamel formulations.

Features: Material offers improved gloss with accelerated baking speed, as well as improved hardness, adhesion to non-drying alkyds, and resistance to food stains and water.

Description: Urea formaldehyde resin has 50% solids content, in 3:2 butanol and xylol. Viscosity (as supplied) is T-W, acid number is 14-18. It is colorless and clear. Resin is offered at same prices as other resins in company's group.

(Uformite F-222 is product of Rohm & Haas Company, Dept. CP, Washington Sq., Philadelphia 5, Pa. . . . or for more information check 5642 on form opposite last page.)

Versatile sugar derivative has low volatility, high permanence

Gives cellulosic materials better dimensional stability

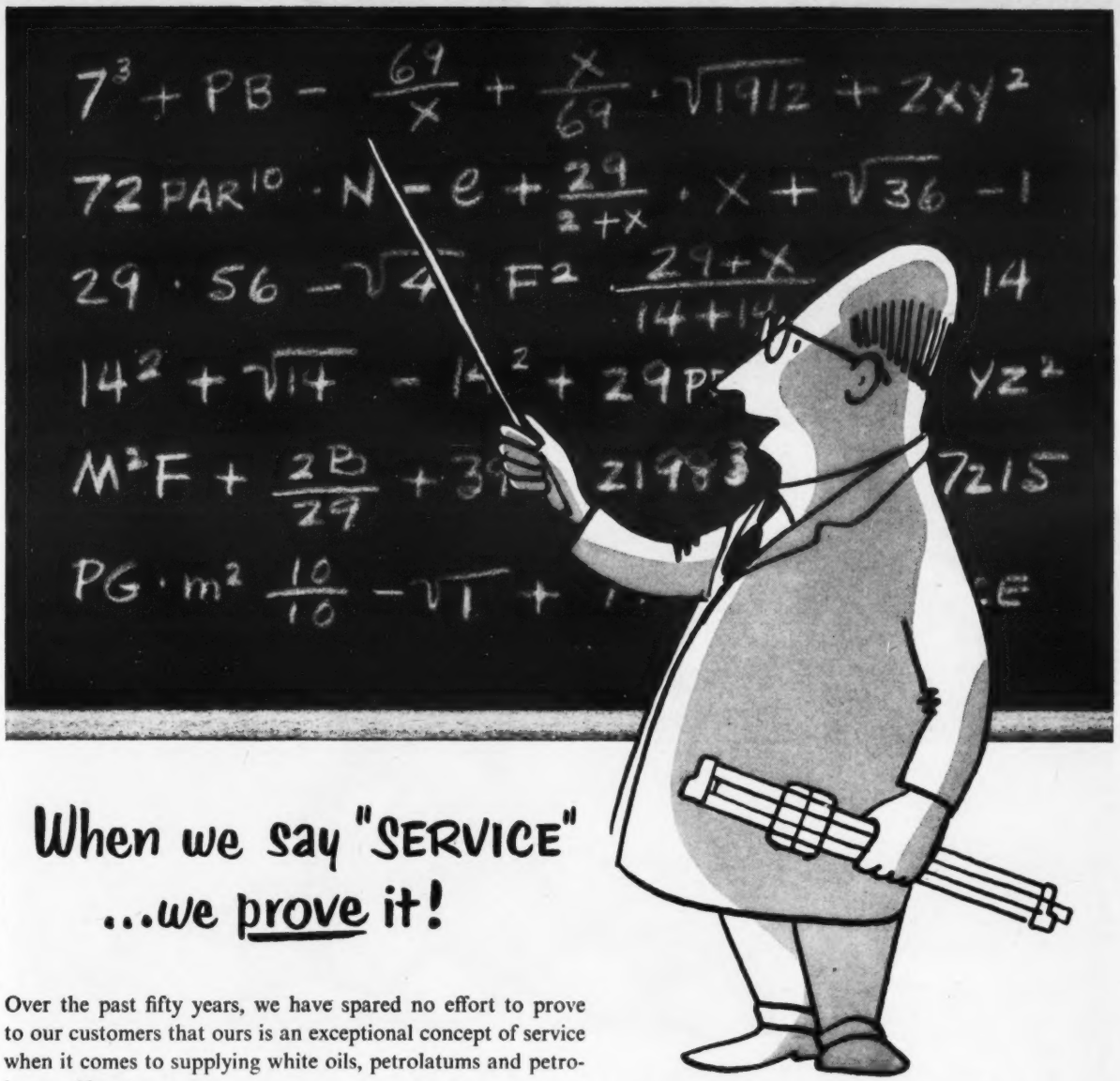
Uses: As crosslinking agent, plasticizer, and surface-active.

Features: Material is less volatile and less affected by atmospheric moisture changes than either glycerine or propylene glycol. It has greater permanence on aging and less effect on lowering tensile strength of cellulosic materials.

Description: Octakis (2-hydroxypropyl) sucrose is made by reacting propylene oxide with sucrose. It is a viscous, yellowish-amber liquid. Specs are:

APHA color (max)	500
Viscosity (Cps, of 75% aq sol at 25°C)	490-660
Sp gr (70/20°C)	1.160-1.180
Volatility (1 hr at 145°C and 0.4 mm Hg, max)	3%

(Hyprose SP80 is product of The Dow Chemical Company, Dept. CP, Midland, Mich. . . . or for more information check 5643 on form opp. last page.)



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As proof of this contention, we have grown steadily, until today we are among the world's largest *specialists* producing these products. As such . . .

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—we maintain laboratory facilities to help our customers solve their individual problems.

—we offer a wide range of these products—and will tailor-make them, if necessary, to meet your specific requirements.

. . . That our concept of service fits in with your needs, we stand ready to prove . . . if you will but telephone, wire, write, or fill in the coupon!

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300 Fourth Avenue, New York 10, N. Y.

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Will you please send me Technical Data on the following:

☐ "General Information on White Mineral Oils" I.R. Bulletin "A"

☐ "General Information on Petrolatums" I.R. Bulletin "B"

☐ "General Information on Petroleum Sulfonates" I.R. Bulletin "G"

What can you do to help me solve this problem?

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Name.....

Company.....

Address.....

City.....Zone.....State.....

When inquiring check 5644 opposite last page

Pair of plasticizers offer considerable cost savings

Also make synthetic lubes

Uses: As plasticizers and in making synthetic lubes.

Features: Similar in physical properties and performance to the corresponding normal sebacates, these products can be substituted in most applications with a considerable cost reduction.

Description: Di-2-ethylhexyl isosebacate (DOIS) and di-n-butyl isosebacate (DBIS) are monomeric, ester-type plasticizers. Their respective chemical formulas are $C_8H_{16}(COOC_8H_{17})_2$ and $C_8H_{16}(COOC_4H_9)_2$.

(Kesscoflex DOIS and DBIS are products of Kessler Chemical Co., Inc., Dept. CP, State Rd. and Cottman Ave., Philadelphia 35, Pa. . . . or for more information check 5646 on convenient form located opposite last page.)

Low-cost liquid defoamers used with emulsion paints

Uses: Defoamers for use in processing latex, polyvinyl acetate, or acrylic resin paints.

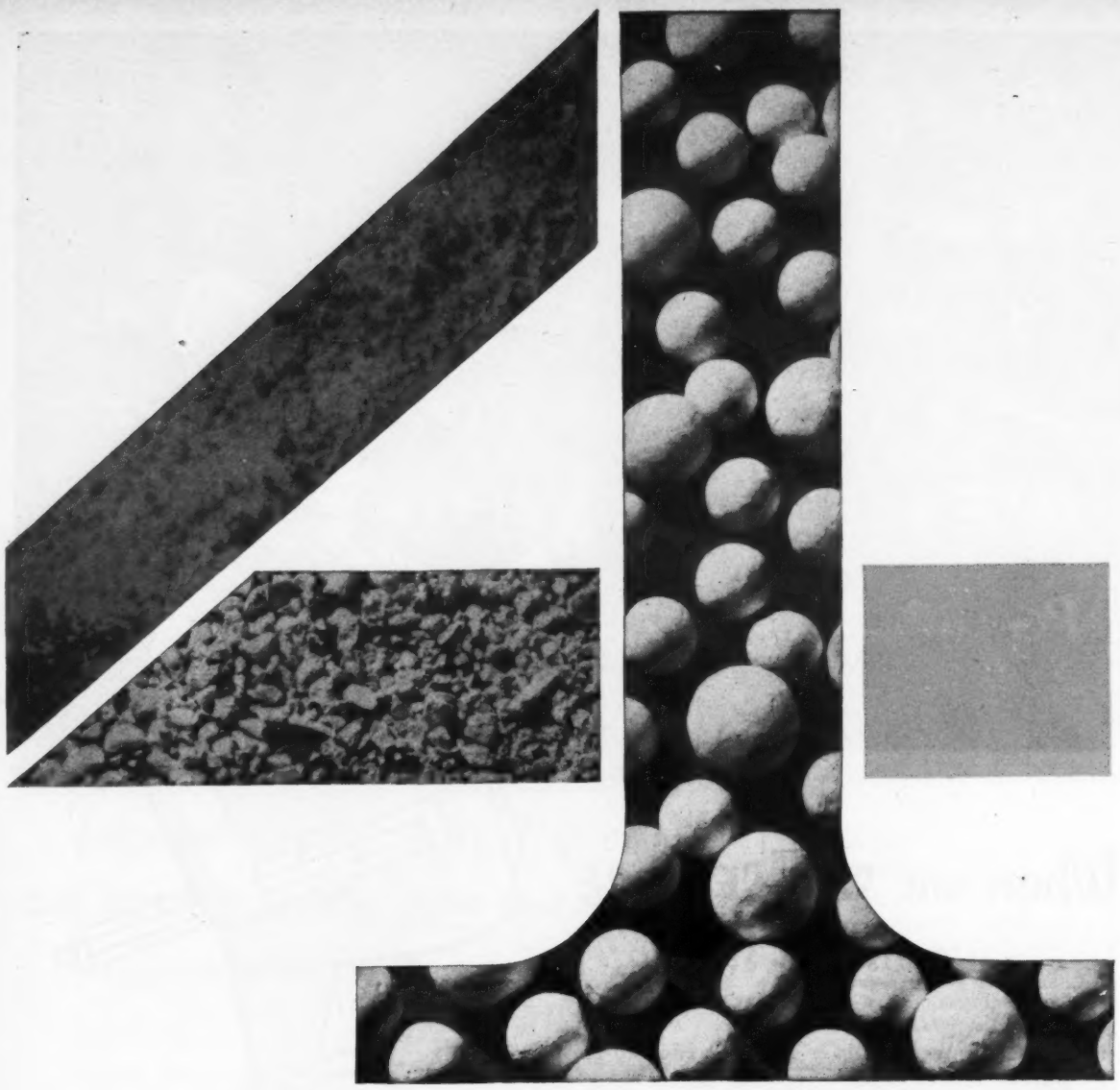
Features: Low cost, have film-forming properties, are designed for addition during pigment-grinding process.

Description: Defoamers are of vegetable origin, come in trial quantities.

(Defoamers 566 and 567 are products of Technical Products Dept., Swift & Co., Dept. CP, 1800 165th St., Hammond, Ind. . . . or for more information check 5647 on form opposite last page.)

Methacrylic acid data

Bulletin of 18 pages covers properties, polymerization, copolymerization, reactions and applications of glacial methacrylic acid. SP-88 4/57 — Rohm & Haas Co., Dept. CP, Washington Sq., Philadelphia 5, Pa. Check 5648.



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When inquiring check 5645 opposite last page

Three analytical tools added to company's organic chemicals

Selective precipitant for sodium, a long-sought analytical tool, has been found in DL-methoxyphenylacetic acid. Compound is useful for separating sodium out of solutions containing large concentrations of potassium, rubidium, ammonium, magnesium, chloride, nitrate, phosphate, and sulfate ions. It can also be used to separate up to 30 milligrams per liter of lithium ion.

Free radical that is crystallizable at room temperature and can serve as scavenger for other free radicals may be prepared by treating another compound added to the group, 1,1-diphenyl-2-picrylhydrazine, with lead peroxide.

Another reagent, this time for titanium, 1-(*p*-chlorophenyl)-3-hydroxy-3-phenyltriazene, has also been added to the list.

(Laboratory reagents are products of Distillation Products Industries, a div. of Eastman Kodak Co., Dept. CP, Rochester 3, N.Y. . . . or for more information check 5649 on form opposite last page.)

Ba-Cd stabilizer is free of all fatty acids and octoates

Gives optical clarity, and heat, light stability

Uses: As stabilizer for vinyl film and sheeting, extrusions, plastisols, and organosols.

Features: Liquid is completely free of all fatty acids and octoates. It provides optical clarity, outstanding heat and light stability, and superior heat sealing and printability characteristics.

Description: Barium-cadmium stabilizer for vinyls provides increased water resistance and lower hazing.

(Thermolite 112 is product of Metal & Thermit Corp., Dept. CP, Rahway, N.J. . . . or for more information check 5650 on form opposite last page.)

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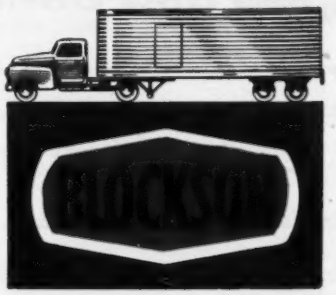

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then change to a Dow Corning SILICONE DEFOAMER

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Effective against even the most violent foamers, Dow Corning SILICONE DEFOAMERS are so efficient they pay for themselves many times over. And remember when you use one of these economical silicone defoamers, you also free yourself from the worry of boil-overs and any fire hazards that may result.

So . . . stop choking on your FOAM problems—change to a Dow Corning SILICONE DEFOAMER.

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My foamer is

Oil system _____

Aqueous system _____

Other _____

When inquiring check 5652 opposite last page

Expoxy resin curing agent features safe handling, low cost

Uses: As curing agent for epoxy resins.

Features: Agent provides high heat distortion point (up to 140°C) good chemical resistance, and high strength. It exhibits good electrical properties even when moist. It is much less volatile than other curing agents, and costs considerably less per pound than most epoxide resins themselves.

Description: Curing agent belongs to aromatic diamine class of hardeners. It functions as true cross-linking or curing agent, not as a catalyst. Each amine (NH_2) radical is potentially capable of reacting with two epoxide groups. For resins having epoxide value of 175-300, approximately 20 to 30 parts of curing agent per 100 parts of resin is recommended. Physical properties are:

Form	Light brown lumps
Sp gr	1.15
Melting point (°C)	+73
Storage stability	good

(Tonox-PL is product of Naugatuck Chemical, Div. of US Rubber Co., Dept. CP, Naugatuck, Conn. Check 5653 opposite last page.)

Rare earth metals, oxides

Fourteen data sheets describe eleven rare earth oxides and gadolinium and yttrium metal which are now available. "Rare Earth Data Sheets" — Rare Earths and Thorium Div., Michigan Chemical Corp., Dept., CP, St. Louis, Mich. Check 5654.

Makes epoxy resins flexible

Improves heat aging, cuts viscosity, extends pot life

Uses: To make epoxy resins flexible.

Features: Flexibilizer becomes a part of the resin, reducing its viscosity, extending pot life, and improving heat aging characteristics. Working life of resin is extended about 80%. Cure time is unchanged.

Description: The clear, deep amber liquid resin has epoxy groups in its structure. When used less than 20% in epoxies, electrical properties are not affected when used for potting or encapsulating.

(Cardolite NC 513 is a product of Irvington Chemical Div., Minnesota Mining & Manufacturing Co., Irvington 11, N.J. Check 5655 on form opposite last page.)

Rubber accelerator is fast-curing

Improves properties also

Uses: As a fast-curing accelerator in rubber compounding.

Features: Contributes higher modulus, increased age resistance, better high-temp properties, greater resistance to flex-cracking, reduced heat buildup.

Description: 2-Mercaptothiazoline is a white powder, non-toxic in normal use.

(2-MT is a product of Rubber Chemicals Dept., American Cyanamid Co., Dept. CP, 30 Rockefeller Plaza, New York 20, N.Y. Check 5656 on form opposite last page.)

Lanolin derivative

Bul of four pages describes hypo-allergenic acetylated liquid derivative of pure lanolin. Emulsions and aerosols are covered. Acetulan Bul—American Cholesterol Products, Inc., Dept. CP, Amerchol Park, Edison, N.J. Check 5657.

Medium viscosity PVC resin is easier processing

Uses: Makes calendered, extruded, injection-molded products. Modifies higher-mw resins.

Features: Calendered plascellent heat-seal, good layflat. Resin has superior flow, tics have smooth surfaces. exmakes compounds of excellent clarity.

Description: Medium viscosity polyvinyl chloride resin is designated as Pliovic S70.

(Pliovic S70 is a product of Chemical Div., Goodyear Tire & Rubber Co., Dept. CP, Akron 16, Ohio . . . or for more information check 5658 on form opposite last page.)

Heat-reflective laminate is heat-transfer barrier to 1200°F temp

Secret: metallized surface of glass/silicone laminate

Uses: As heat blanket, to cut heat transfer in applicable range, and as protection against heat degradation of non-metallics used in air conditioning, heating, appliances, insulation, casings, aircraft, and automotive applications.

Features: Laminate affords an efficient barrier to heat transfer at temperatures up to 1200°F. Additional features: molded designs and weight savings.

Description: Material is a glass fabric-reinforced silicone laminate with a metallized surface. Thickness ranges from 1/32" to ¼". Standard sheet width is 24" (max), and length is 32" (max). Sheets can be molded. Sp gr is 1.80.

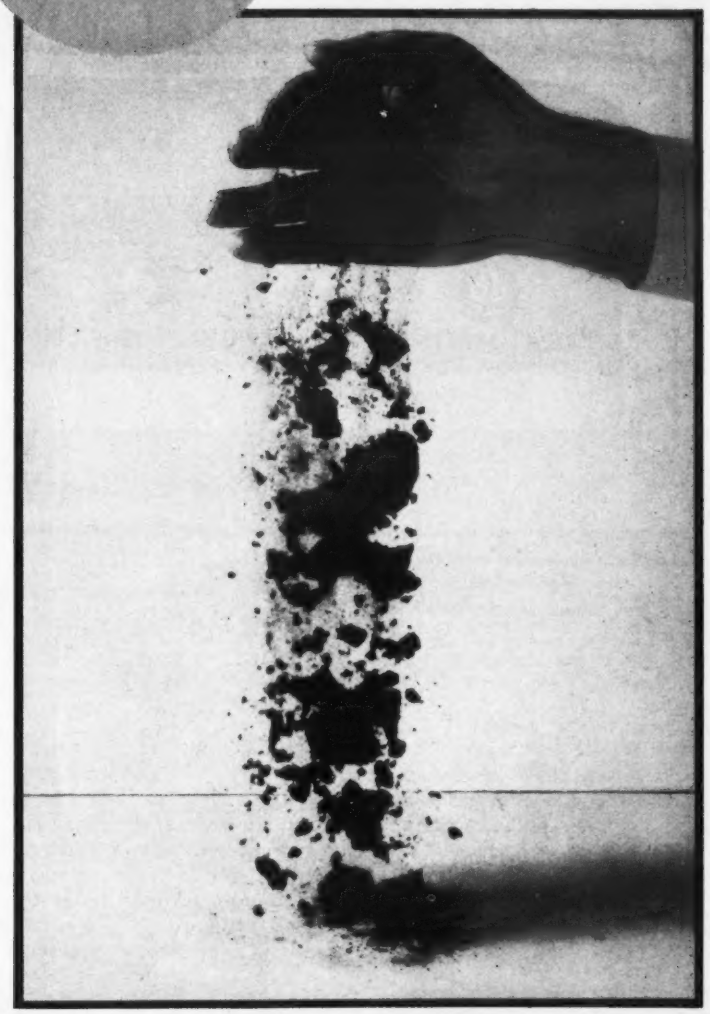
(X5G-138-101 laminate is product of Swedlow Plastics Co., Dept. CP, 6986 Bandini, Los Angeles, Calif. . . . or for more information check 5659 on form opposite last page.)

Fermentation chemistry booklet

Handy booklet of 52 pages describes company history, products, research activities, manufacturing processes, and marketing program of fermentation chemicals. "Men, Molds, and Molecules" — Chas. Pfizer & Co., Inc., Dept. CP, 630 Flushing Ave., Brooklyn 6, N.Y. Check 5660.

GLC Nerofil

the first processed carbon-based filteraid *is now* DUSTLESS



Nerofil, the new-type carbon filteraid which is giving such excellent results in the filtration of caustic and fluorated solutions, is now processed to come to you completely dustless. This unretouched photograph shows a handful of Nerofil, taken directly from the package and dropped on a white table — note that the finest particles are still a powder — not a dust!

Dustless Nerofil is packed in polyethylene-lined bags for protection. For further information, fill out and send in the coupon below.

NEROFIL DEPARTMENT, Great Lakes Carbon Corporation
612 So. Flower St., Los Angeles 17, California

Name_____

Position_____

Company_____

City_____ Zone____ State_____

Note: Nerofil is not offered as an activated carbon

When inquiring check 5661 opposite last page

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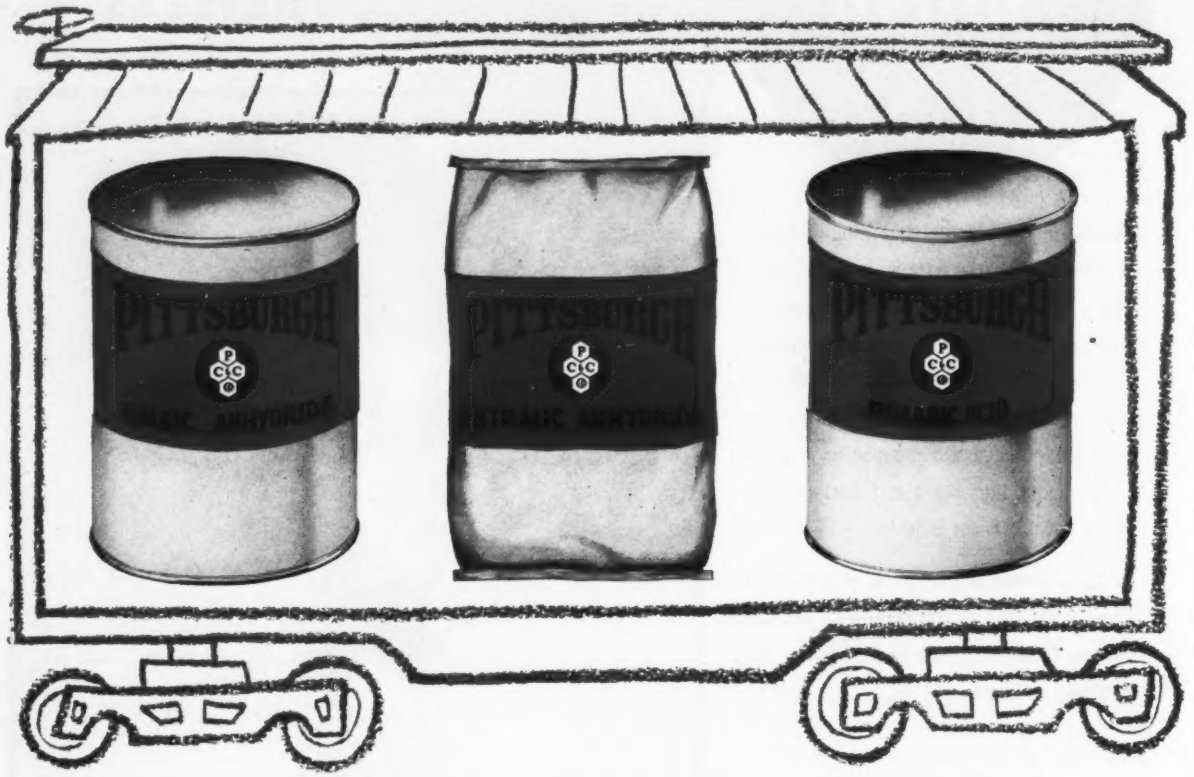
Order all three from Pittsburgh Coke & Chemical!



It makes *good* sense to order your phthalic, maleic and fumaric from one source—Pittsburgh Coke & Chemical. For example, a single order with Pittsburgh simplifies your paper work. And if any follow-up is necessary, it's easier to deal with one supplier than three.

By ordering split carload lots, you'll enjoy favorable carload prices on *all* of the materials you order. You can split the cars in any proportion you like. Smaller orders of lower volume items allow better inventory control at your plant.

Best of all, you enjoy the confidence of doing business with a *basic* producer when you order from Pittsburgh. That means assurance of uniform product quality, continuity of supply, regardless of market conditions, and alert, responsive sales and technical service. ● Write today for specification sheets on any of the Pittsburgh industrial chemicals below.

Products of Pittsburgh's Industrial Chemicals Division

Plasticizers	Alpha Picoline
Benzene	Beta Gamma Picoline
Toluene	Phenol
Xylene	Ortho Cresol
Phthalic Anhydride	Meta Para Cresol
Maleic Anhydride	Ammonium Sulfate
Pyridine	Sulfuric Acid
Fumaric Acid	Phthalocyanines

WSW 5937A

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

When inquiring check 5662 opposite last page

Important analytical tool is superior reagent

Sodium tetraphenylboron, reagent for potassium determinations, has proven superior to the chloroplatinate method in accuracy, speed of analysis, economy.

(Reagent-grade sodium tetraphenylboron is available from Fisher Scientific Co., Dept. CP, 303 Fisher Bldg., Pittsburgh 19, Pa. Check 5663 on form opposite last page.)

Adds three indicators

2-*p*-Dimethylaminostyrl-1,-3,3-trimethyl-3H-pseudoindolium iodide is a reagent for determining sulfur dioxide or smog in air.

3,3'-Dimethylnaphthidine is useful in determining chlorine in water, as an oxidation-reduction indicator, indicator of gallium, vanadium, zinc, cadmium, calcium, and indium.

4,5-Dihydroxy-3-(*p*-sulfophenylazo)-2,7-naphthalenedisulfonic acid trisodium salt is an indicator in titrating zirconium, thorium, and fluoride ion.

N-Phenylbenzohydroxamic acid is used in determination of copper, iron, aluminum, titanium, and vanadium, and as a reagent for tin.

(Organic chemicals are products of Distillation Products Industries, Div. of Eastman Kodak Co., Dept. CP, Rochester 4, N.Y. . . . or for more information check 5664 on form opposite last page.)

Anionic surface-actives

Description, properties, and uses of anionic surface-active agents for paper processing are in 12-page brochure. Slime control, reduction in two-sidedness, and improved retention of fillers or fines are discussed. "Blancol, Blancol N in Paper Processing" — Antara Chemicals, Div. of General Aniline & Film Corp., Dept. CP, 435 Hudson St., New York 14, N.Y. Check 5665.

This is

NATIONAL NORTHERN

...newest AP&CC division

Dedicated to research, development and production in

rocket power technology

Test a rocket motor's performance at 100,000 feet altitude... determine how extremes of temperature affect explosive and propellant charges... develop igniters of maximum sturdiness and reliability. These are typical activities at National Northern Division, West Hanover, Mass., latest addition to the AMERICAN POTASH family. Here, a qualified staff of scientists and technicians conducts research, development, field testing and production of propellants for rockets and missiles, explosives, pyrotechnics, detonators, igniters, squibs, gas generators, fuzes and other items.

Extreme environmental conditions are simulated in the laboratory or encountered in actual field tests on the firing range at West Hanover or the 1900-acre test range at Halifax, Mass. Here, too, AP&CC will extend its facilities for the investigation and development of TRONA* boron, lithium and perchlorate chemicals in high energy fuels.

For more than ten years National Northern has demonstrated its ability to work in close coordination with others. As an integral part of AMERICAN POTASH & CHEMICAL CORPORATION it is ready to go to work for you!

We invite inquiries leading to research and production contracts.

NATIONAL NORTHERN'S CURRENT FIELDS OF ACTIVITY:

ROCKET-MOTOR-IGNITER DEVELOPMENT • GAS GENERATORS • SURVEILLANCE TESTING OF EXPLOSIVES AND AMMUNITION • EFFECT OF ALTITUDE ON PERFORMANCE OF EXPLOSIVES, PROPELLANTS, TRACERS AND INCENDIARY ELEMENTS • DESIGN OF ELECTRIC DETONATORS AND SQUIBS • AIRCRAFT VULNERABILITY TESTS AND EVALUATION • EXPLOSIVE METAL FORMING

TRONA

American Potash & Chemical Corporation

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99 PARK AVENUE, NEW YORK 16, NEW YORK
NATIONAL NORTHERN DIVISION
P. O. BOX 175, WEST HANOVER, MASSACHUSETTS

*TRADEMARK AP&CC

For more information on product at right, specify 5666 see information request blank opposite last page.

YTTRIUM

Availability of high purity yttrium and rare earth oxides

A report by LINDSAY

Only three years ago, most high purity rare earths were little more than laboratory curiosities.

Today they are extensively used for an amazing variety of chemical and industrial applications.

What happened? Lindsay technicians pioneered the first commercially installed ion exchange unit for the production of separated rare earths. The process was patterned after techniques developed by Doctors Spedding and Powell of the Institute for Atomic Research at Ames, Iowa.

Lindsay's pilot plant rare earth ion exchange installation had 40 six-inch columns. This unit made purified rare earths available to industry for the first time in practical, even though still limited, quantities.

The response from industry was so enthusiastic, we were forced to expand our ion exchange facilities rapidly. Today we have in continuous operation more than 100 columns with large production units of eighteen-inch and sixty-inch diameters.

With our larger production facilities, we are now making prompt shipments of high purity yttrium and rare earth oxides in quantities from a gram to hundreds of pounds.

TYPICAL MAXIMUM IMPURITIES IN LINDSAY PURIFIED RARE EARTH AND YTTRIUM OXIDES

ATOMIC NO.	OXIDE	CODE	PURITY	% RARE EARTH MAXIMUM IMPURITIES AS OXIDES
57	La_2O_3. LANTHANUM OXIDE	528 529	99.99 99.997	0.01 Pr, 0.001 Ce. 0.0025 Pr, 0.0005 others
58	CeO_2. CERIC OXIDE	215 216	99.8 99.9	0.2 (largely La + Pr + Nd). 0.1 (largely La + Pr + Nd).
59	Pr_6O_{11}. PRASEODYMIUM OXIDE	726 729.9	99 99.9	1 La + Nd + smaller amounts of Ce and Sm. 0.1 Ce + Nd.
60	Nd_2O_3. NEODYMIUM OXIDE	628 629 629.9	95 99 99.9	1-4 Pr, 1-4 Sm, 0.5-1 others. 0.1-0.4 Pr + 0.1-0.4 Sm + 0.5 others. 0.1 (largely Pr + Sm).
62	Sm_2O_3. SAMARIUM OXIDE	822 823	99 99.9	0.2-0.7 Gd, 0.2-0.6 Eu, and smaller amounts of others. 0.1 (largely Nd + Gd + Eu).
63	Eu_2O_3. EUROPIUM OXIDE	1012 1011	98-99 99.8	1-2 Sm + smaller amounts of Nd + Gd + others. 0.2 (largely Sm + Gd + Nd).
64	Gd_2O_3. GADOLINIUM OXIDE	928.9 929.9	99 99.9	1 Sm + Eu + trace Tb. 0.1 Sm + Eu + trace Tb.
65	Tb_4O_7. TERBIUM OXIDE	1803 1805	99 99.9	1 Gd + Dy + Y. 0.1 Gd + Dy + Y.
66	Dy_2O_3. DYSPROSIUM OXIDE	1703 1705	99 99.9	1 (largely Ho + Y + Tb + small amounts of others). 0.1 Ho + Y + traces of others.
67	Ho_2O_3. HOLMIUM OXIDE	1603 1605	99 99.9	1 (largely Er + Dy + small amounts of others). 0.1 Er + Dy + traces of others.
68	Er_2O_3. ERBIUM OXIDE	1303 1305	99 99.9	1 Ho + Dy + traces Yb and Y. 0.1 Ho + Tm.
69	Tm_2O_3. THULIUM OXIDE	1405 1403	99.9 99	0.1 Er + Yb + trace Lu. 1 Er + Yb + trace Lu
70	Yb_2O_3. YTTERBIUM OXIDE	1201 1202	99 99.9	1 Er + Tm + trace Lu. 0.1 Tm + trace Lu + Er.
71	Lu_2O_3. LUTETIUM OXIDE	1503 1505	99 99.9	1 Yb + Tm + traces of others. 0.1 Yb + Tm + traces of others.
39	Y_2O_3. YTTRIUM OXIDE	1112 1115 1116	99 99.9 99.9+	1 Dy + Gd + traces Tb and others. 0.1 Dy + Gd + traces Tb Approx. 0.05 Dy + Gd.

COSTS GREATLY REDUCED

Of course, as production of purified rare earths increased, costs came down. For example, only three years ago Terbium Oxide cost $500 a gram. Today you can obtain moderate size lots at less than $3 a gram.

Now that you know these high purity oxides are so readily available and the cost so remarkably low, what are *you* waiting for?

Rare earths, in purities up to 99.99%, have captured the interest and imagination of scientists in many industries as valuable new tools for the improvement of processes and products.

Your research, product development and production people should investigate the possibilities of these materials. Our bulletin "Purified Rare Earth and Yttrium Oxides" will give you detailed information and prices.

PLEASE ADDRESS INQUIRIES TO

LINDSAY CHEMICAL COMPANY

288 ANN STREET • WEST CHICAGO, ILLINOIS

When inquiring check 5667 opposite last page

CHEMICAL MATERIALS

Low-cost softening agent has good solubility, resists yellowing

Insures uniform softness

Uses: As substantive softener for use with all fibers.

Features: Low-cost material has exceptionally even rate of exhaustion, insuring uniform softness throughout package or beam in pressure machines. Possessing excellent solubility, softener's chlorine retention is low and its yellowing resistance high.

Description: Cationic-nonionic agent may be used either on alkaline or acid side and is claimed to be compatible with wide variety of thermosetting and thermoplastic resin formulations.

(Dexene CS-15 is product of Dexter Chemical Corp., Dept. CP, 819 Edgewater Rd., New York 59, N.Y. Check 5668 opposite last page.)

Acrylic paint technology

Booklet of 12 pages reviews water-thinned paints, technology of acrylic emulsions, acrylic paint formulations, making acrylic paints, equipment, application, and properties. "Concepts of Acrylic Emulsion Paint Technology" —Rohm & Haas Co., Dept. CP, Washington Sq., Philadelphia 5, Pa. Check 5669.

Guarantee color stability of stearic acid

Uses: For applications with esters, plasticizers, soaps, cosmetics, candles, and other products where it is important for white or light color to be retained.

Features: Double-pressed stearic acid is guaranteed for color stability.

Description: Stearic acid has guaranteed color stability of 4.0 red and 30 yellow on 5¼" Lovibond scale, after two hours at 200°C.

(Neo-Fat 18-54 is product of Chemical Div., Armour and Co., Dept. CP, Chicago 9, Ill. Check 5670 opp. last page.)

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

Chemical Polish for Pure Zinc Improved With Ethyl Alcohol

An improved polish for zinc, consisting of nitric acid, ethyl alcohol, and hydrogen peroxide has been developed by a leading research laboratory.

Immersion of pure zinc for about two minutes in a bath of these chemicals is said to produce a high and lasting luster that resists rapid oxidation up to temperatures of around 660°F in air or in a sodium-potassium nitrate salt bath.

The role of ethyl alcohol in this polish appears to be that of a moderator of the nitric acid. Although polishes composed of other chemicals have been used for zinc, the nitric acid-ethyl alcohol-hydrogen peroxide polish is said to have longer life and to produce on the zinc a thinner oxide film of increased stability.

It is recommended that users prepare the polish fresh daily. *Caution:* ethyl alcohol should never be poured into nitric acid; the reverse, however, may be done safely. Interested readers who wish detailed assistance may call on U.S.I.'s technical service staff.

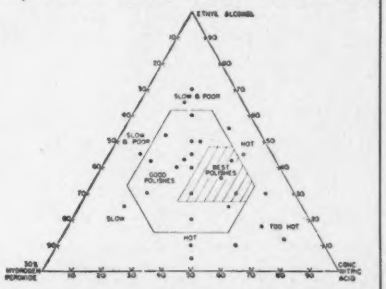


Diagram illustrates chemical polishing baths for zinc, based on 2 min. immersion time. (Diagram from "Journal of Metals.")

New Centrifuges Underscore Titanium Strength

High speed centrifuges fabricated with an aluminum-vanadium alloy of titanium now are in operation on an experimental basis. They are reputed to run 28% faster than stainless, with no greater working stress in the bowls.

Steady increase in such applications of titanium is expected — namely, where high strength-weight ratio as well as corrosion resistance is needed. Titanium now can be alloyed, welded, and bonded with chrome (U.S.I. Chemical News, May, '57). With three times the strength of aluminum, but only half the density of steel, titanium has been in heavy demand for aircraft components subject to severe resonance conditions.

U.S.I. is building a titanium sponge plant at Ashtabula, Ohio, which is expected to go on stream late this year. This modern plant will employ a sodium reduction process, and on the basis of present figures will turn out high purity titanium sponge at lower cost than any other existing commercial technique.

Organosodium Compounds Open Way to Economical Synthesis of Many Organometallic Compounds

Higher Yields Than with Conventional Grignard Reagents; Safer, Simpler Processing Among Advantages Cited

Many organometallic compounds can now be synthesized economically and safely from organosodium compounds, according to a paper recently presented before the American Chemical Society. In some cases the latter compounds can be used as intermediates to prepare an otherwise hard-to-make Grignard reagent. In others they can be reacted directly with metal halides to form new carbon-metal bonds.

Grignard reagents, compounds of magnesium with an organic halide, have long been standard building blocks for synthesizing organometallic compounds. However, from the commercial standpoint many Grignard reagents are difficult and hazardous to prepare, some require costly iodides or bromides as starting materials, and yields of desired organometallic compounds are frequently disappointing.

Among the advantages of organosodium compounds cited by the investigators are high yields and safety and convenience in handling.

For example, phenylsodium reacts with boron trichloride to form triphenylborine in 70% yield. Benzylsodium and phosphorus trichloride produce tribenzylphosphorus in 84% yield. Also, in this whole class of reactions, sodium as a starting material is more economical than the magnesium of typical Grignard reagents. Finally, reactions proceed in a hydrocarbon medium, thus eliminating the hazard of storing and handling large quantities of ether, the solvent used with Grignard reagents.

Reactions of RNa Compounds

The route to organometallic compounds from metallic sodium employs two general reactions. In the first an organic halide is reacted with sodium to produce an organosodium compound:

$$RCl + 2\,Na \rightarrow RNa + NaCl$$

This product is then reacted with a metallic halide to yield the desired organometallic compound:

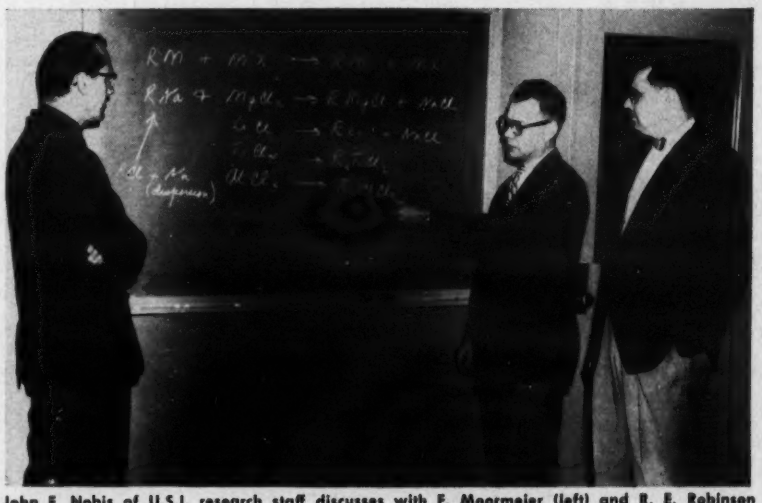
$$RNa + MgCl_2 \rightarrow RMgCl + NaCl$$

Organosodium compounds may react with the halides or alkoxides of lithium, magnesium, mercury, boron, aluminum, silicon, germanium, tin, lead, titanium, zirconium, phosphorus and iron.

Sodium Dispersions Key Factor

The recent introduction of simple and safe techniques for laboratory or plant preparation of finely dispersed sodium has stimulated wide interest in the use of organosodium compounds. Hansley's studies on preparation

MORE



John F. Nobis of U.S.I. research staff discusses with F. Moormeier (left) and R. E. Robinson (extreme right) equations for reaction of organosodium compounds to form various carbon-metal bonds. They presented a paper entitled "Use of Organosodium Compounds for Preparation of Other Carbon-Metal Bonds," at the Spring meeting of the American Chemical Society.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

★ U.S.I. CHEMICAL NEWS ★

CONTINUED

Organosodium

and use of finely dispersed sodium (10-30 μ) to produce phenylsodium in 90% yields* opened a new era in organosodium chemistry.

Extensive research in U.S.I. laboratories shows that phenylsodium and benzylsodium can be made by carefully controlled conditions which include the presence of a slight excess of freshly dispersed sodium. The reaction between chlorobenzene and sodium under these conditions is immediate and complete: one mole of phenylsodium can be prepared in only 20 minutes. This reaction is easily adapted to larger scale and is now being used industrially.

The largest commercial plant utilizing organosodium compounds will soon be in operation at Tuscola, Illinois where U.S.I. is using disodiooctadiene, made directly from butadiene and dispersed sodium, to produce U.S.I. Isosebacic® acid, a mixture of 10-carbon dibasic acids.

(A new brochure on the preparation of sodium dispersions is available from U.S.I.)

Advantages of Organosodium

Until practical techniques for making sodium dispersions were developed, the reaction of an organosodium compound with magnesium chloride to produce a Grignard reagent had no commercial value. In general, it was easier to prepare Grignard reagents than the corresponding organosodium compounds. Now, however, there are cases where organosodium compounds can be made from starting materials which yield Grignard reagents only with difficulty. For example, organic chlorides react very sluggishly with magnesium, but yield organosodium compounds quite readily.

As a result, many Grignard reagents which have been prepared from expensive iodides or bromides can now be obtained from the cheaper chlorides, often in higher yields than are possible by the former method. Other organosodium compounds, synthesized by reactions which are completely unknown in the field of organomagnesium chemistry, can now be converted to hitherto unattainable Grignard reagents.

*V. L. Hansley, *I&EC* 43, 1759 (1951)

Cube-Shaped Polyethylene Containers for Corrosives Promote Lab Safety

An ingenious new container gives laboratory workers an almost accident-proof way to receive, store and dispense corrosive reagent chemicals.

The package consists of a cube-shaped polyethylene vessel inside a double corrugated paperboard box which serves as a shipping carton. The user need never remove the polyethylene cube from the box; the latter has a slotted opening for a pouring mouth on the cube and a pull-out safety grip for easy handling.

The new container is now being used by a leading manufacturer of reagent chemicals for packaging solutions of sodium hydroxide and potassium hydroxide in 1-gallon size.

It is light, unbreakable, and the unique design makes it convenient to dispense the contents. An economy feature is that no deposits are required, and there are no empties to return.

Polyethylene "Coating", "Lamination" Defined

An industry standard adopted by the National Flexible Packaging Assn. defines the difference between "coating" and "lamination", as these terms are applied to polyethylene packaging.

A coating is "a substance deposited while in a liquid state on a web without the use of adhesive means between the combined materials". Lamination is "the combination of two or more webs by the use of an adhesive layer between the webs".

Coating is the more common method. U.S.I. PETROTHENE 203 is a polyethylene resin that is widely used for this application.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U. S. I.

New adhesives for labels feature resin emulsion glue which penetrates silicone layer to bond on the glass surface. The adhesives feature controlled tacking in clear non-staining micro-thin films which are noncrystallizing, says company. **No. 1260**

A pamphlet on titanium tubing offers information on size range and tolerances and mechanical, physical and working properties of tubular titanium. **No. 1261**

A new remote control baffle for fume hoods is operated from an outside control panel. Manufacturer claims baffle can be quickly adjusted for any desired air flow aperture without interrupting work or exposing personnel to injury. **No. 1262**

A double acting rust remover is said to remove light rust in a few minutes, heavy rust in one to two hours. Deposits a rust-inhibiting film as it works, requires no rinsing of treated metal. **No. 1263**

A new booklet entitled "Zirconium and Hafnium" is now available. It covers in detail the mechanical and physical properties of the materials as well as general methods of fabrication and corrosion resistance. **No. 1264**

A new vinyl paint is said to achieve 5 to 8 times the film thickness per spray pass as other vinyl paints. Supplied in 8 colors, it is also said to be fast drying, easy to apply, economical, corrosion-resistant. **No. 1265**

Deuterated solvents and organo-metallics of high isotopic purity are now available in experimental quantities, with a wide range of research applications, including NMR spectroscopy. **No. 1266**

Color dispersion and intensity in plastics are said to be improved by a new extender. This product is also reported to increase lubricity, mold-release, and brightness of finish in many plastics. **No. 1267**

A continuous water vapor recorder determines low concentrations of water vapor in air or gas streams by measuring heat energy exchanged in adsorption or desorption. Designed for pipe lines, drying towers, feed streams. **No. 1268**

An external manipulator for tubing applies pressure externally on a flexible tube, producing a continuous, metered flow of liquids which can be as low as 0.1 cc. per day, according to the maker. **No. 1269**

A detector kit, small, compact and practical, rapidly determines low concentration of vapors of toluene diisocyanate and toluene diisocyanate urea. Said to be especially useful in plants making polyurethane plastics. **No. 1270**

PRODUCTS OF U.S.I.

INORGANIC CHEMICALS:

Sodium, Metallic: cast solid in tank cars, steel drums, pails; bricks in barrels, pails.
Chlorine: liquid, in tank cars.
Caustic Soda: 50% liquid, in tank cars.
Sodium Peroxide: dust-free granules, in drums.
Sulfuric Acid: all strengths, 60° Baumé to 40% Oleum. Also electrolytic grade to Federal specifications. Tank cars or tank wagons.
Ammonia: Anhydrous, commercial and refrigeration. Tank cars or tank wagons. Also Nitrogen Fertilizer Solutions.

OTHER PRODUCTS:

Alcohols: Ethyl (pure and all denatured formulas), Normal Butyl, Amyl, Fusel Oil; Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL® PR.

PETROTHENE® Polyethylene Resins.

Esters, Ethers and Ketones: Normal Butyl Acetate, Diethyl Carbonate, Diethyl Oxalate, Ethyl Acetate, Ethyl Ether, Acetone.

Intermediates and Fine Chemicals: Acetoacetarylides, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate solution, Urethan USP (Ethyl Carbamate).

Animal Feed Products: Calcium Pantothenate, Choline Chloride Products, Curbay B-G® 80, Special Liquid Curbay®, DL-Methionine, Niacin USP, Riboflavin Concentrates, Vitamin B_{12} and Antibiotic Feed Supplements, Vacatene® 40, Vitamin A, D_3 and K_3 Products, Antioxidant (BHT) Products.

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Riboflavin USP, Urethan USP, Intermediates.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corporation
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Excellent bond strength, low compression set in silicone rubber

Uses: Primarily as cloth coating stocks.

Features: Stocks have excellent bond strength, low compression set, and high degree of resistance to reversion under clamps.

Description: Silicone rubber comes as liquid dispersion, shipped ready for solution-coating on glass cloth. When vulcanized, it is very temperature-stable. It retains its resilience from 600° to brittle point of −178°F.

It is easily processed. Typical properties, after 24 hours in circulating air oven at 600°F, included Shore A Scale hardness rating of 63, tensile strength of 770 psi, and 200% elongation.

(Silastics 6535 and 2071 are products of Dow Corning Corp., Dept. CP, Midland, Mich. . . . or for more information check 5671 on form opposite last page.)

Use as binder seen for polymerized ethyl silicate

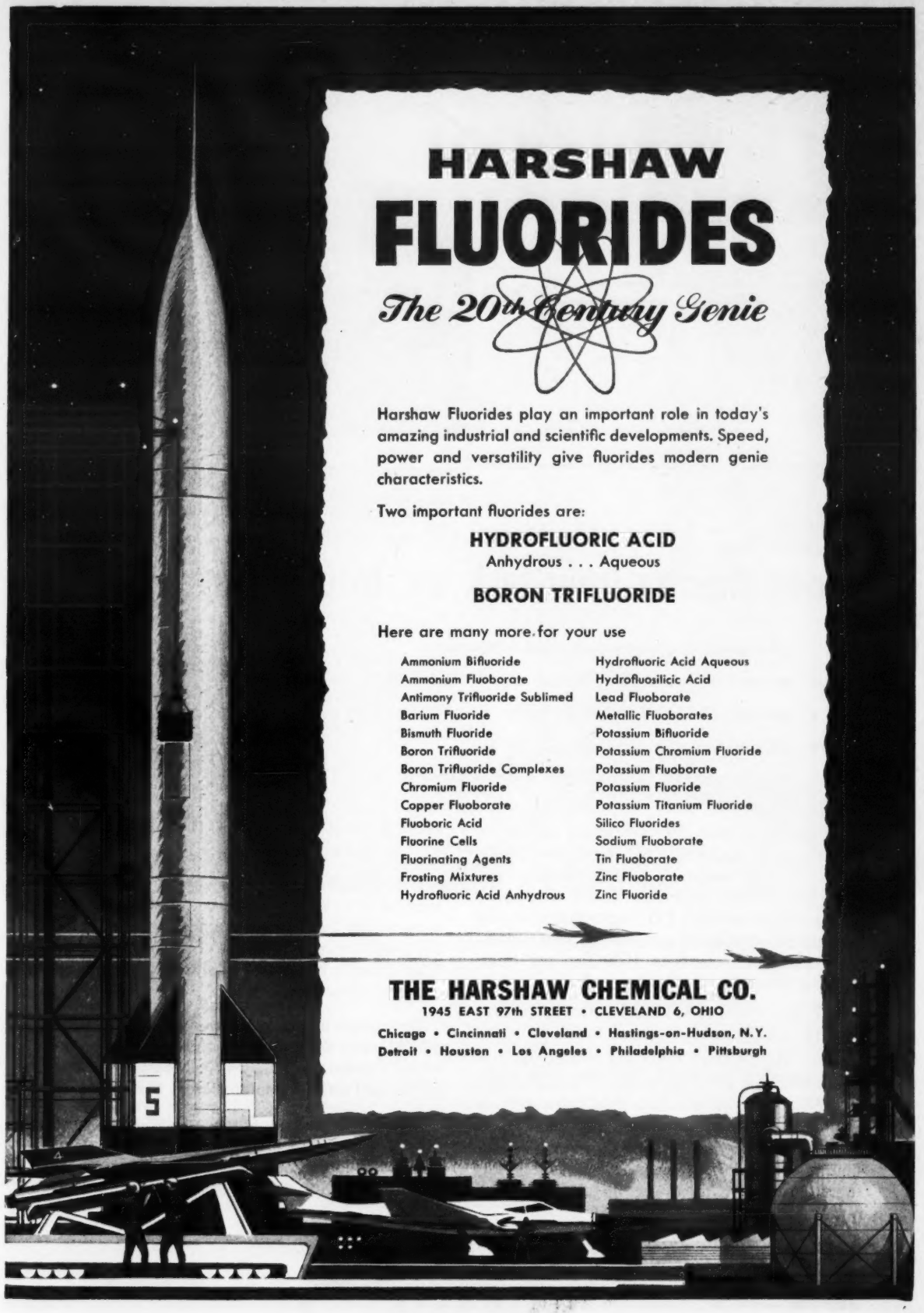
Uses: As a binder for high-temp refractories, in treatment of graphite carbon molds, to retard weathering of stone or ceramic surfaces, as a binder in powder metallurgy. Also extensively used in investment castings.

Features: Now produced in USA.

Description: Polymerized ethyl silicate has 41.85% available SiO_2, no acidity to methyl orange, no suspended matter, APHA color of 5, and 1.065 sp gr (20°/20°C).

(Polymerized ethyl silicate is a product of Inorganic Chemicals Div., Monsanto Chemical Co., Dept. CP, St. Louis 4, Mo. . . . or for more information check 5672 on form opposite last page.)

For more information on product at left, specify 5673 . . . see information request blank opposite last page.



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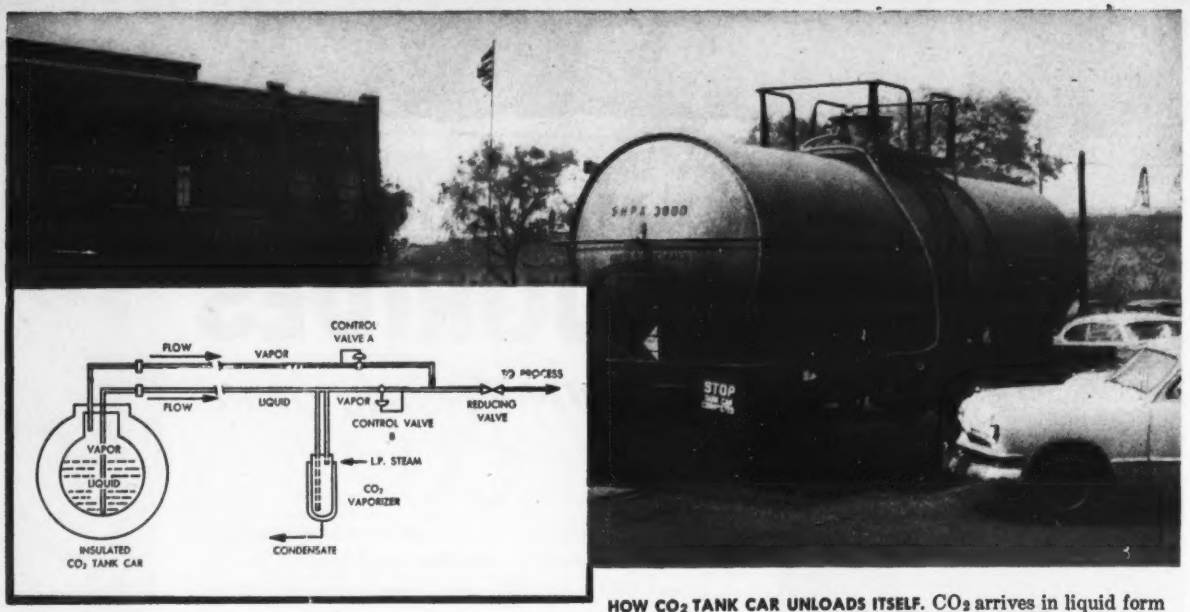


HOW CO_2 TANK CAR UNLOADS ITSELF. CO_2 arrives in liquid form with vapor pressure of less than 300 lbs. psig. Diagram at left shows how automatic unloading system sends CO_2 vapor directly to process. (Control valve A is open when line pressure is 220 lbs. psig or higher. Valve B is open below 200 lbs. psig.) Photo courtesy of Pfister Chemical Works in Ridgefield, New Jersey.

CO_2 goes directly from tank car to process...

- **eliminates expensive storage and refrigeration**
- **no need to handle CO_2 cylinders or convert dry ice**
- **cuts down maintenance and upkeep**
- **reclaims valuable plant space or land**
- **assures constant CO_2 flow that matches demand**

Here's a remarkable, new, exclusive method of handling CO_2 shipments that may prove profitable to many users of carbon dioxide. It's Olin Mathieson's patented *Direct Unloading System—CO_2*, in which CO_2 vapor flows directly from special, insulated tank cars to your process ...at rates of from 6 to 1500 lbs. per hour, varying directly with the demand.

This new system bypasses intermediate steps such as storage in refrigerated tanks, handling of cylinders, or converting dry ice, along with the expensive, extensive facilities that these require.

Completely automatic, this method requires no power—only a small, low-pressure steam line. The distance from spur to plant is generally immaterial. Olin Mathieson installs and maintains the system and leases the cars to you so that no demurrage occurs.

Direct unloading prevents any venting as long as CO_2 is used in process, while an uninterrupted flow is maintained by connecting the coupling stations in parallel along the spur. This allows a balanced switchover from emptying tank cars to full ones.

On-time shipments are assured by Olin Mathieson's CO_2 plant at Saltville, Va.,—the world's largest—and by Olin Mathieson's fleet of 24- and 30-ton insulated tank cars.

Direct Unloading System—CO_2 can be installed in a matter of weeks. Why not contact Olin Mathieson soon to see whether it can be profitably adapted to your operation.

4726

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

When inquiring check 5675 opposite last page

CHEMICAL MATERIALS

Six inorganic chemicals in research quantities have many uses

Available in research quantities are six inorganic chemicals.

Fluorenone oxime — intermediate in organic synthesis; potassium fluoroacetate — intermediate for organic synthesis and biological research.

Monofluoroacetic acid — for preparation of salts, organic esters have fungicidal properties; dihydroxy maleic acid — for preparation of pharmaceutical intermediates.

p-Fluorophenol — preparation of esters useful as lubricants, plasticizers; glycollic aldehyde — for biological research and preparation of intermediates.

(Inorganic chemicals are available from Abco Chemical Co., Dept. CP, 2316 Atlantic Ave., Brooklyn 33, N.Y. . . . or for more information check 5676 on form opposite last page.)

Non-staining antioxidant for polyethylene films in safe near foods

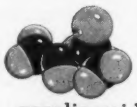
Uses: For high-pressure polyethylene films for food packaging.

Features: Manufacturer says compound is safe to use in polyethylene films for food packaging. It effectively protects both high- and low-pressure polyethylene against degrading effects of heat processing even in concentrations as low as 50 ppm of plastic.

Description: Pharmacology Division of FDA has accepted concentrations of non-staining antioxidant up to 0.05% (by wt) in high-pressure polyethylene for food packaging. Acceptance of its use in low-pressure polyethylene food films is now pending. Chemically, compound is purified dialkyl phenol sulfide.

(Santonox is product of Organic Chemicals Div., Monsanto Chemical Co., Dept. CP, St Louis 4, Mo. . . . or for more information check 5677 on form opposite last page.)

VINYL MONOMERS . . . endless possibilities, thanks to polymer chemistry



Vinyl acetate . . . vinyl propionate . . . methyl isopropenyl ketone . . . and now acrylic acid esters . . . these Celanese monomers are starting points for practically endless product improvements. They have already enabled production of better binders for non-woven fabrics and for water and grease-resistant coatings. They have improved plastics . . . they have improved the properties of emulsions for latex paints, leather, paper and textiles . . . they have enhanced properties of synthetic fibers and rubbers.

These are but a few of the improvements engendered by the Celanese series of monomers. And Celanese research, development and production know-how promise more and better basic materials for polymer chemistry. The new acrylic acid esters, for example. The unit for their production is nearing completion and soon will be "on stream," supplying acrylates in commercial volume.

Constant research for more productive basic organic chemicals...availability of a vast supply of raw materials to keep production in continuous volume...these are the factors upon which Celanese bases its service to industry. Celanese Corporation of America, Chemical Division, Dept. **591-S**, 180 Madison Avenue, New York 16, N.Y. Celanese®

For more information on product at right, specify 5678 see information request blank opposite last page.

Basic reasons . . . . . for improved products

Acids	Functional Fluids	Polyols
Alcohols	Gasoline Additives	Plasticizers
Aldehydes	Glycols	Salts
Anhydrides	Ketones	Solvents
Esters	Oxides	Vinyl Monomers

Celanese CHEMICALS

Agricultural	Paper
Automotive	Pharmaceutical
Aviation	Plastics
Building	Surface Coatings
Electrical	Textiles

Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Ave., N. Y. 16.

Nonionic-anionic agent has best features of both

Uses: For all scouring and wetting applications on cottons and synthetics.

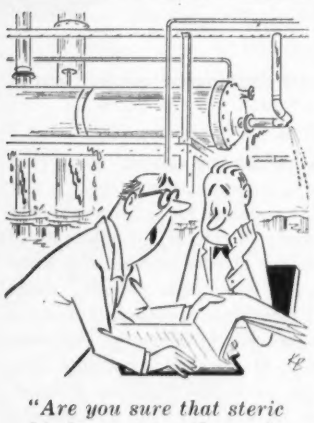
Features: Good solubility, detergent, wetting, and dispersing properties combined with high stability to acids, alkalies, and hard water salts.

Description: Nonionic-anionic surface-active agent is highly concentrated, light colored gel. It has excellent rinsability and, containing no sulfur, low degree of corrosion. Product is a powerful dispersing agent for acetate dyes.

(Carbanone A is available from Hart Products Corp., Dept. CP, 1440 Broadway, New York, N. Y. . . . or for more informration check 5679 on form opposite last page.)

New tung oil derivatives

Chemistry of tung oil derivatives and their properties as plasticizers are reported in 20-page bulletin. ARS-727 — Southern Utilization Research and Development Division, United States Department of Agriculture, Dept. CP, 1100 Robert E. Lee Blvd., New Orleans 19, La.



"Are you sure that steric hindrance is the only possible explanation for our bad yields?"

Thanks to Ken Boyea, Hercules Powder Co., Holyoke, Mass.

BRIEFS FOR BUYERS

about Caustic Soda • Phosphorus Chlorides • Potassium Chlorate, Perchlorate

Chemicals for a growth area

Pulp, petroleum, and plywood are three of the main reasons why industry is popping in western Canada.

Fitting neatly into this growth picture is the new plant of Hooker Chemicals Limited, in North Vancouver, B. C. This plant is Canada's first chlor-alkali producing point west of the Rockies.

By rail and barge, it will supply caustic soda and chlorine for making and bleaching pulp; more caustic soda to help sweeten petroleum refinery products and to produce plywood adhesives.

Hooker customers around Vancouver will enjoy a freight saving on these chemicals, which formerly came into the area by sea-going barge from our Tacoma plant.

Phosphorus chlorides . . . growing, growing

You will be hearing more about the Hooker phosphorus chlorides described below. Current trends in organic synthesis are creating a growing need for the properties they put at your command.

Phosphorus oxychloride, $POCl_3$, is something you'll want to investigate if you're developing organic phosphates or plasticizers, gasoline additives, or fire-resistant hydraulic fluids.

As a chlorinating agent, it neatly supplements and broadens your already wide choice of Hooker chlorine-containing compounds. It's used also as a catalyst for intermediates and dyestuffs, and in preparation of medicinals such as sulfa drugs.

A clear water-white liquid, it assays 99.5 minimum $POCl_3$ and contains no free chlorine or phosphorus pentachloride.

Phosphorus trichloride, PCl_3, has wide repute as a convenient entry to many types of organic synthesis.

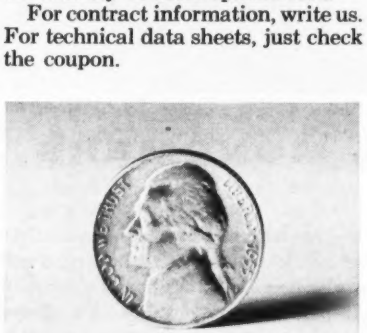
You can use it as a chlorinating agent in manufacture of organic acid chlorides; as a condensing agent in preparation of organic aldehydes; in making phosphite and phosphonate esters; and as a catalyst in certain chlorination reactions.

It's a clear water-white liquid of 99.5% minimum purity.

If you're already buying either of these versatile products in quantity, or plan to do so soon, be sure your supplier has what it takes to get the material to you promptly. Both these chemicals require special handling; volume deliveries are usually made in lead-lined tank cars.

When you purchase from Hooker, you *can* be sure, because you have at your disposal the largest fleet in the country of these special cars.

For contract information, write us. For technical data sheets, just check the coupon.



How to save 5¢ a pound on sulfides

If you're buying sodium sulfide as a source of combined sulfur, here's a way to get the sulfur for about 5 cents a pound less.

Just switch to Hooker *sodium sulfhydrate.*

In 100 lbs. of sodium sulfide, you get about 24.6 lbs. of combined sulfur. The same weight of sodium sulfhydrate gives you about 40 lbs. of sulfur—about 62.6% more.

At prevailing prices, the sulfur in sodium sulfide costs you about $.224 a pound. In sodium sulfhydrate, it's only about $.169 a pound.

Your actual saving is larger than the difference—because sodium sulfhydrate contains less water of crystallization, so freight cost is lower.

If this approach to lower-cost sulfidity looks like a good one for you, why not explore it with your Hooker salesman? He'll gladly help you review the facts with your specific needs in mind.

Facts on caustic potash

While there are a few growing uses for dry forms of caustic potash (notably the powder and flake), about 8.5 out of every 10 pounds of KOH purchased in the U. S. are bought as liquid, either standard or low-chloride grade.

Reasons for this are pretty clear: liquid KOH is easier to handle than solid forms, and cheaper to buy (particularly in the higher concentrations).

Shipping strength of liquid KOH is limited, by its penchant for crystallizing in cool weather, to a narrow range between 45% and 52%. Big-volume users sometimes order 52% to keep freight cost down; this is about the practical limit on strength.

NIALK® liquid caustic potash is regularly shipped at 45% to 52% concentration. It is extremely low in iron content.

If your process economics favor a solid form of KOH, you can get a wide choice by specifying NIALK brand. We ship 90% caustic potash as fused solid, flake, granular, walnut, broken, powder, or crushed.

("Walnut" is used in liquefying air; flake and powder often go into cleaning compounds, mixed with caustic soda, soda ash, metasilicates, and phosphates.)

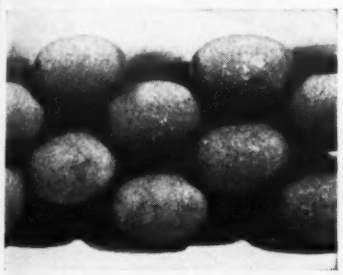
odium Sulfhydrate • Caustic Potash

odium Chlorate • Oxalic Acid • Other Chemicals

We also supply 85% KOH in flake or solid form.

KOH is a "specialty" alkali. You buy it for specific properties you just can't get from other alkalies. Making it takes special skills, too.

You can have confidence in the same skill that pioneered caustic potash on this continent and has supplied NIALK KOH for half a century. We continue to supply a major portion of the growing requirements of this country.



Specialization: extreme case

Maybe the point of this piece is that you never know how a Hooker chemical can help you—until you try it.

At any rate, we've just published new data sheets on two products you'll probably *never* buy. They're very useful, but very specialized.

One of them is Hooker *potassium chlorate*. There's a little of it in the heads of three out of every five safety matches made in this country.

The other is Hooker *potassium perchlorate*. Even more exclusive, it goes almost entirely into railway fusees and fireworks.

How our specialization can help you

Perhaps *your* need for a chemical is as specialized as this. Perhaps our new, wider diversity includes an *existing* product or process that can help you meet this need.

To find out, why not ask us?

More $NaClO_3$ coming

Thanks to our OLDBURY products plants at Niagara Falls, N. Y., and Columbus, Miss., we're presently the nation's largest producer of sodium chlorate. But even that isn't good enough to meet *tomorrow's* needs.

The Columbus plant has been in production since 1954. Last year we upped its capacity by 5,000 tons per year. Now we're building again. By early 1958, another 5,000 tons yearly will be on tap.

Assuming you're in the market for sodium chlorate, may we submit these three reasons for making Hooker your supplier:

1. Fastest service you can get east of the Rockies.
2. Skilled technical help when you need it.
3. Sodium chlorate of 99.5% minimum purity.

May we spell out these advantages for you in more detail? If so, just write.

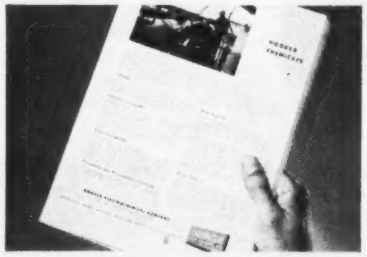
New data on oxalic acid

To keep your technical file up to date, send for our newest publication on OLDBURY oxalic acid: Data Sheet No. 789.

It lists specifications, typical physical properties, packing data, uses, and handling precautions. For a copy, check the coupon.

New bulletin lists Hooker products

You'll find a complete up-to-the-minute listing of Hooker chemicals in this new 12-page bulletin. Indexed for ready reference, it lists the chemicals you can buy from us in commercial quantity, including chemicals sold under the NIALK® and OLDBURY® brand names.



Under each product you'll find a short description and condensed listing of properties, actual and suggested uses, and shipping containers. The bulletin also sums up for you the major types of processing performed at Hooker.

If you'd like to have this up-to-date timesaver in your file or on your desk, just check the coupon for a copy of new *Bulletin 100-A*.

For more information on chemicals mentioned on this page, check here:

- ☐ Caustic Soda, liquid
- ☐ Caustic Soda, flake and solid
- ☐ Phosphorus Oxychloride
- ☐ Phosphorus Trichloride
- ☐ Sodium Sulfhydrate
- ☐ Caustic Potash
- ☐ Sodium Sulfide
- ☐ Potassium Chlorate
- ☐ Potassium Perchlorate
- ☐ Sodium Chlorate
- ☐ Oxalic Acid
- ☐ New list of products—Bulletin 100-A

Clip and mail to us with your name, title, company address. *(When requesting samples, please use business letterhead.)*

HOOKER ELECTROCHEMICAL COMPANY
509 FORTY-SEVENTH STREET, NIAGARA FALLS, N. Y.

NIAGARA FALLS • TACOMA • MONTAGUE, MICH. • NEW YORK • CHICAGO • LOS ANGELES

HOOKER CHEMICALS PLASTICS

When inquiring check 5680 opposite last page

Nonionic surface actives provide effectiveness from 0 to 100°C

Uses: For all phases of textile and paper processing; as solubilizer for water insoluble oils.

Features: Products are effective over temp range of 0 to 100°C.

Description: Series of nonionic surface-active agents consists of four products of ascending molecular weights. One member of series (J-500) can be used at boiling point of water without serious loss of its surface-active properties. All are aliphatic polyoxyethylene ether alcohols. They are clear liquids of low viscosity, pale yellow to amber in color, and with mild, pleasant odor.

("J" series is available from Industrial Chemicals Div., Olin Mathieson Chemical Corp., Dept. CP, Baltimore 3, Md. . . . or for more information check 5681 on form opposite last page.)

Predict new foam material will bring superior product at competitive price

Claim high tensile strength, greater resilience, cushioning

Uses: As urethane foams for cushioning, underlay, and insulating material.

Features: Material is claimed to be superior to other types of foams at competitive price. It is said to weigh less than half of natural latex foam, have greater resilience, and better cushioning qualities. Higher tensile strength will enable manufacturers to sew or stitch directly through material without tearing.

Description: Polyether-based urethane foam has high degree of compatibility with other materials.

(Polyfoam is product of The General Tire and Rubber Co., Dept. CP, Akron, Ohio . . . or for more information check 5682 on form opposite last page.)

HOW HERCULES HELPS...

WITH PENTAERYTHRITOL. Outstanding resistance to heat, to light, and to moisture have made PE-based alkyd resins the preferred approach to many of the newest developments in surface coatings. Other applications for this new chemical—in such things as vinyl plastics, fire-retardant paints, and floor coverings—are growing rapidly. The demand for PE has skyrocketed. And Hercules, with a new Midwest producing plant, is assuring ample room for even further product developments.

WITH PLASTICS. The first commercial plant utilizing the famed Ziegler process is now on stream in Parlin, N. J. producing Hi-fax®. This completely new Hercules ethylene polymer offers a combination of characteristics never before available in any plastic. The panel board below displays some of the superior housewares made with Hi-fax. Providing many advantages over conventional polyethylene, Hi-fax is already finding other applications in a wide variety of products.

HERCULES

HERCULES POWDER COMPANY
INCORPORATED
900 Market St., Wilmington 99, Del. Sales Offices in Principal Cities

CHEMICAL MATERIALS FOR INDUSTRY

G57-8

When inquiring check 5683 opposite last page

CHEMICAL MATERIALS

Low-cost textile resin adds crease resistance, lessens shrinkage

Uses: As textile resin for cotton and viscose.

Features: Fabrics finished with resin have improved crease resistance, greater shrinkage and stretch control, and curing conditions are less critical than with conventional resins.

Description: Material is a clear liquid resin, with low free-formaldehyde content. It is soluble in water and very compatible with finishing agents. There is little, if any, degradation from chlorine bleaching.

(Waroset LCR is product of Warwick Chemical Div., Sun Chemical Corp., Dept. CP, 10-10 44th Ave., Long Island City 1, N.Y. . . . or for more information check 5684 on form opposite last page.)

Chemical development

Development and uses of products derived from animal and vegetable fats and oils are covered in digest-size, 12-page booklets. A series: "Ideas in Development" — Armour Chemical Div., Dept. CP, 1355 W. 31st St., Chicago 9, Ill. Check 5685.

Satin-finished molded parts can withstand 500°F temperatures

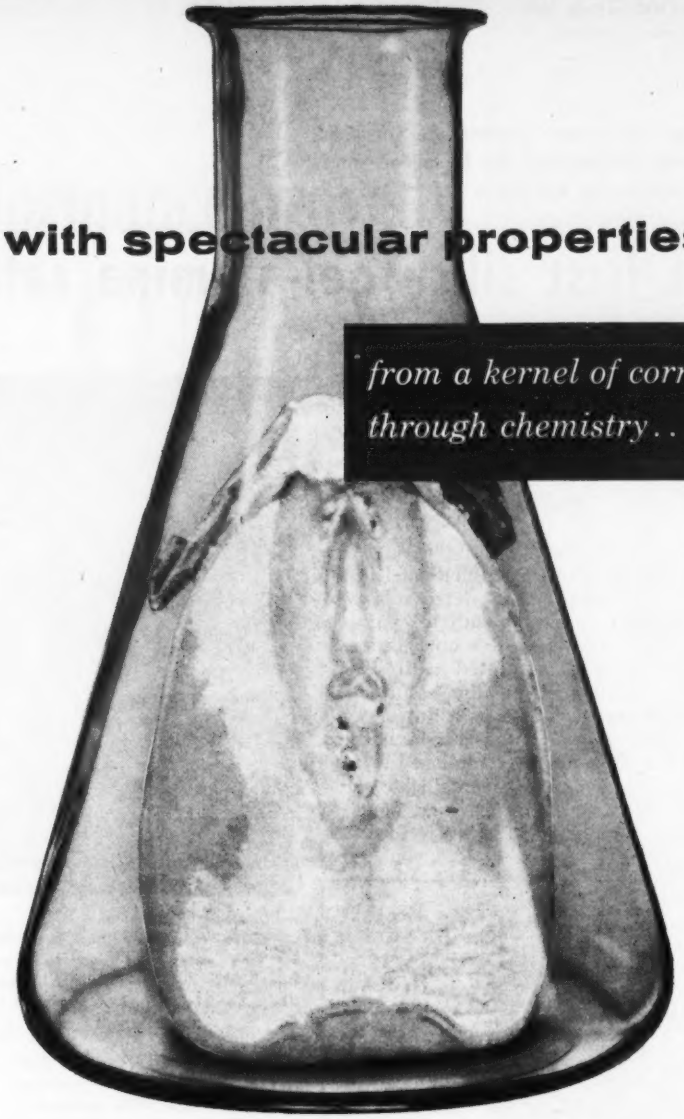
Molding compound offers low shrinkage, thermal expansion

Uses: For molding appliance parts that can withstand boiling water and oven-hot temperatures.

Features: Compound produces satin-finished parts that can withstand temperatures up to 500°F. It can be molded under temperatures ranging from 300 to 370°F, using standard molding pressures. Low shrinkage and minimum thermal expansion are offered.

Description: Phenolic molding compound is suitable for use in either cold-powder or

STARCHES with spectacular properties



☐ **DRY-FLO**—a *hydrophobic* starch powder that flows like a liquid. It is water repellent, yet absorbs water vapor without losing mobility. USES: Dusting powder, fluidifying agent, lubricating agent, detackifier, emulsifier, water repellent film.

☐ **CATO STARCHES**—starches that carry a *cationic* charge as an integral part of their polymeric structure. Unusual properties include a strong affinity for negatively charged surfaces. USES: Size, binder, flocculant, stabilizer, thickener.

☐ **NAPONS**—a series of starch derivatives with a controlled balance of hydrophilic and hydrophobic groups. Products show a unique combination of *emulsifying*, thickening, and film forming properties. USES: Size, emulsifier, thickener.

☐ **NU-FILMS**—a series of *hydrophilic* starch derivatives which are polyelectrolytes. Dispersions offer excellent stability. Different viscosity grades are available. USES: Thickener, finger paints, lotions, leather pasting, sizing.

☐ **VULCAS**—a series of modified corn starches with *controlled swelling* ability. Supplied with varying degrees of toughness. USES: Food thickener, cosmetic powders, separator in dry cells, textile printing paste thickener.

☑ **CHECK THE STARCHES** you'd like to know more about for use in:

_____
_____
_____
_____
_____
_____

National
STARCH PRODUCTS INC.

270 Madison Avenue, New York 16 • 3641 So. Washtenaw Avenue, Chicago 32 • 735 Battery Street, San Francisco 11

When inquiring check 5686 opposite last page

pre-heated pill molding. Second molding compound is medium heat-resistant material, engineered to resist temperature up to 400°F, and for industrial applications where strength and easier moldability are required.

(Phenolic molding compounds are product of Chemical Materials Dept., General Electric Co., Dept. CP, One Plastics Ave., Pittsfield, Mass. . . . or for more information check 5687 on form opposite last page.)

Lists organic chemicals

Catalog of 88 pages prices hundreds of organic compounds, available in research quantities. Cat 8 — Aldrich Chemical Co., Inc., Dept. CP, 3747 N. Booth St., Milwaukee 12, Wis. Check 5688.

Improved light resistance with red pigment

Uses: For printing ink, plastics, and rubber industries.

Features: Exceptionally bluish-shade red is obtained. Pigment has improved light resistance compared to other non-bleeding azo reds.

Description: B-O-N red pigment can be used alone or in combination with other clean colors to obtain wide variety of shades. It is metallic salt of a diazotized aryl amine-sulfonic acid coupled to beta-oxy-naphthoic acid.

(Further information on Polaris Red CP-1285 may be obtained from Pigment, Color & Chemical Div., The Sherwin-Williams Co., Dept. CP, 260 Madison Ave., New York 16, N.Y. . . . or check 5689 on form opposite last page.)

Lists aromatic chemicals

Manufacturer's list of essential oils, aromatic chemicals, and fixatives is in 12-page catalog and price list. "Price List, April 1957" — Fritzsche Brothers, Inc., Dept. CP, Port Authority Building, New York 11, N.Y. Check 5690.

Marking another step towards making the Canadian petroleum industry self-sufficient, big $6 million plant on stream near Montreal is . . .

Canada's first silica gel-alumina catalyst plant

Synthetic silica gel-alumina fluid cracking catalyst is now being produced on a large scale in Canada. A big $6 million plant went on stream in July 1957, thereby contributing to the self sufficiency of the Canadian petroleum industry. Up to now, the industry has been almost entirely dependent upon US sources of supply for this important catalyst. The plant employs about 100 and is located on a 30 acre tract at Valleyfield, near Montreal. It's output has been scaled to provide for Canadian requirements for the foreseeable future.

The plant is owned by Davison Chemical Ltd, an affiliate of Davison Chemical Company Division of W. R. Grace & Co. The Canadian plant is similar in design and identical in product to Davison plants at Baltimore, Cincinnati, and Lake Charles. Combined output of these plants make the company the largest producer of this catalyst.

In operation the plant consumes large quantities of sodium silicate solution, sulfuric acid, anhydrous ammonia, and alumina hydrate. All of these materials are of Canadian origin. National Silicates Limited, of New Toronto, constructed a sodium silicate solution plant adjacent to the catalyst plant and supplies its product through a pipeline.

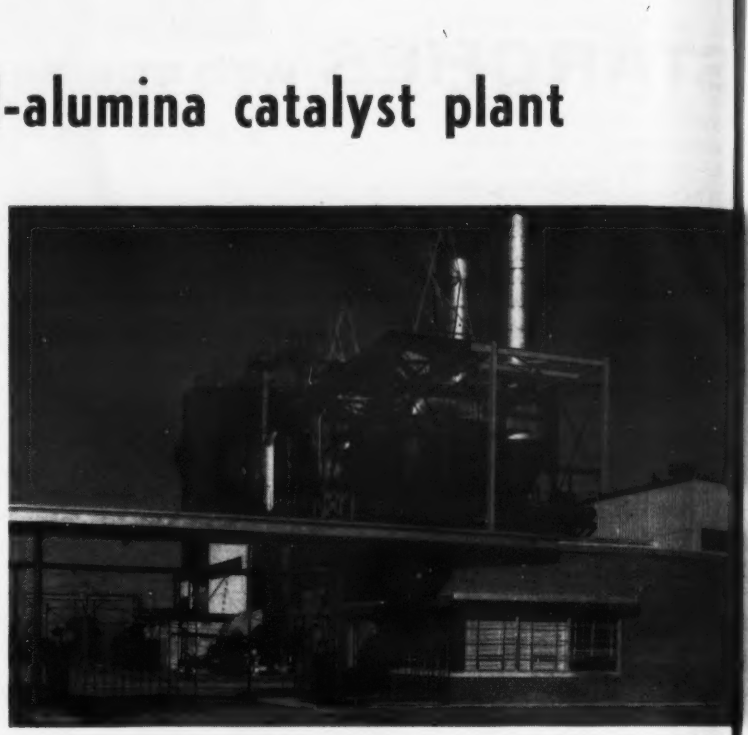
Process Description

Alumina hydrate (65% Al_2O_3) is mixed with sulfuric acid in an acid-proof, brick-lined tank to form aluminum sulfate. Sulfuric acid also flows to a mixing nozzle where it is diluted with water. Simultaneously, the solution of sodium silicate is diluted with water in a mixing nozzle. A third mixing nozzle combines the acid solution and sodium silicate solution. This mixture then flows to a tank where it reacts to form the primary gel.

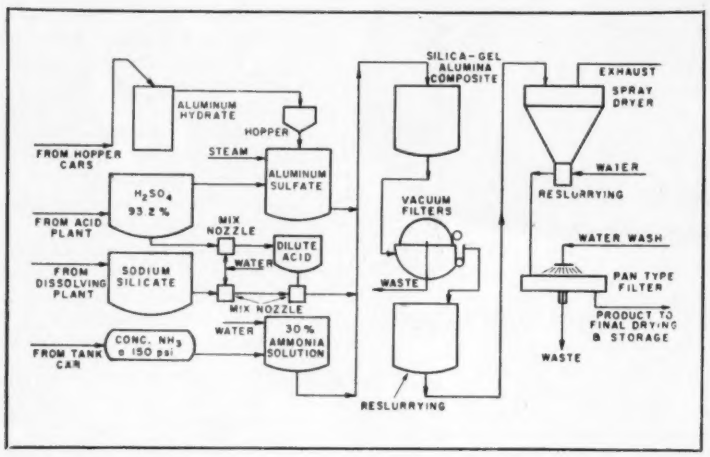
This formation is then mixed with batches of aluminum sulfate and 30% ammonia solution in cypress wood tanks equipped with stainless steel agitators, to form silica-alumina composite. At this stage careful control of reaction times and temperatures establishes such qualities as density and porosity.

The composite is a slurry with ammonium sulfate and sodium sulfate as impurities, which are removed in the next step. This consists of passing the slurry through 11½ ft diam by 16 ft long stainless steel, drum-type filters. Filtrate contains the impurities.

The cake is diluted with water and pumped to spray dryers where a microspheroidal-shaped product is formed. Again, careful control keeps particles within desired diameters and maintains proper density, porosity, and other qualities. At bottom of

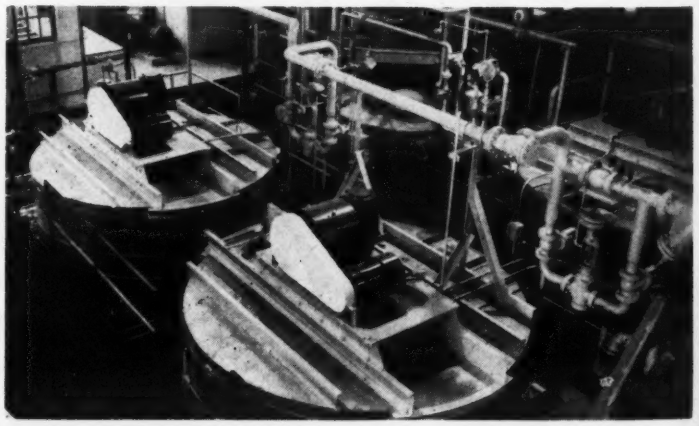


Cake from drum filters is diluted with water and sent to spray dryers (center) where microspheroidal-shaped product is formed



Simplified diagram shows steps involved in process for manufacturing synthetic silica gel-alumina fluid cracking catalyst

Primary gel formation is mixed with batches of aluminum sulfate and ammonia solution in cypress wood tanks equipped with stainless steel agitators

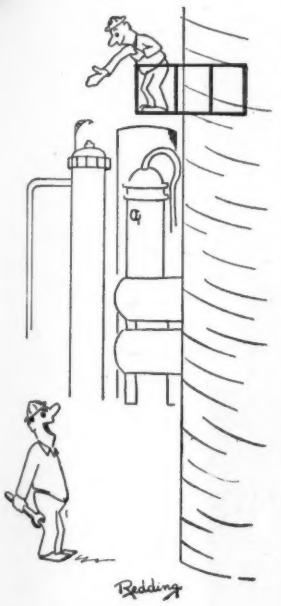


spray dryer, the catalyst is again reslurried and pumped to pan-type filters, where it is spray washed to remove any remaining impurities.

Final product is dried in cage mill flash dryer. Dried catalyst is separated from air stream by battery of cyclones and sent to storage silos ready for shipping.

Product is a dry white powder resembling talc. It is described as fluid because its characteristics are such that in catalytic cracking it flows with the petroleum being processed. The microspheroidal catalyst averages only 3% fines of less than 20 microns in diameter, resulting in minimum loss of catalyst. In addition, the smooth shape of the particles makes them less subject to attrition.

(For additional information on synthetic silica gel-alumina fluid cracking catalyst check 5691 opposite last page.)



"Where do you get that 'Romeo, Romeo' business?"

Dreamed up by James V. Redding, The Central Pharmacal Co., Seymour, Indiana

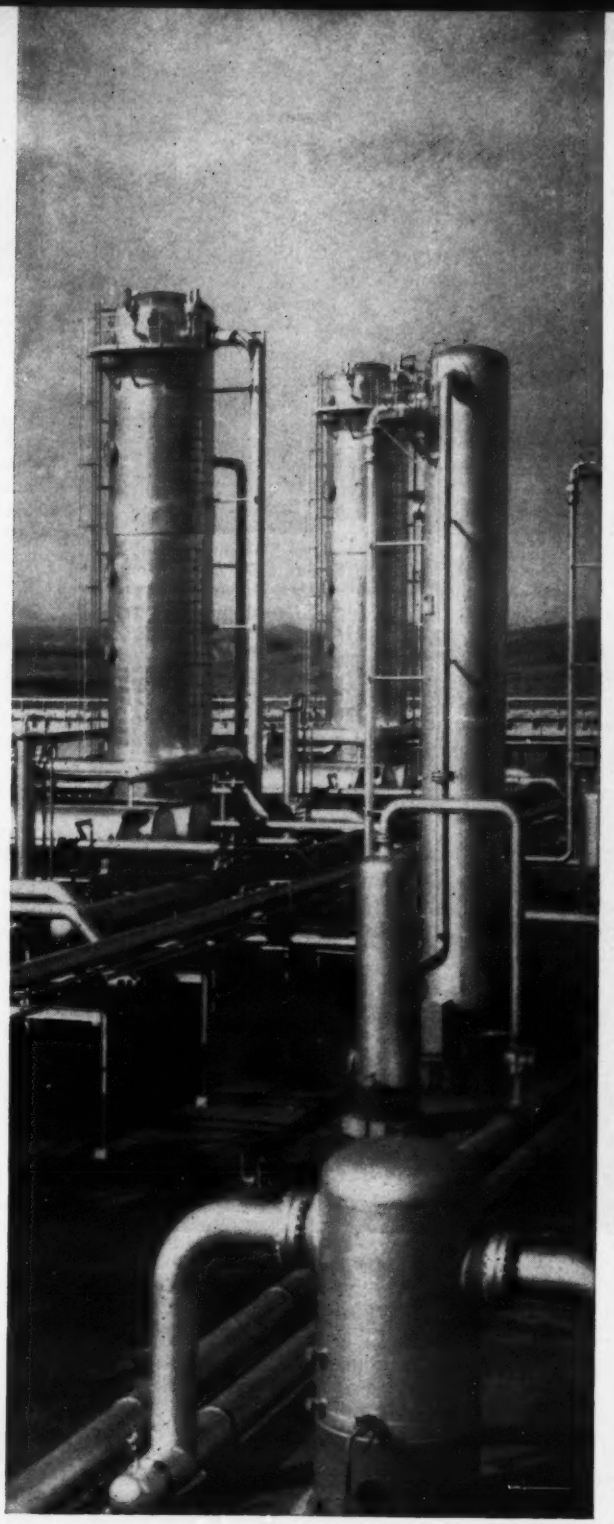
Performance-proved CURE for CORROSION HEADACHES

Specify Alcoa Aluminum for
• Process Equipment
• Transfer and Storage
• Plant Structures

Excessive maintenance and replacement of materials and equipment has fast become the biggest single headache in the process industries. Corrosion is far and away the most serious cause of such headaches. That's the big reason why aluminum—Alcoa® Aluminum—is daily being specified and installed in an increasing variety of uses throughout the process industries.

No other metal can match the ability of aluminum to resist successfully so many types of corrosive attack. And aluminum can be used to bring that unmatched corrosion resistance to a variety of applications . . . because only aluminum combines these *other* valuable properties in a single metal:

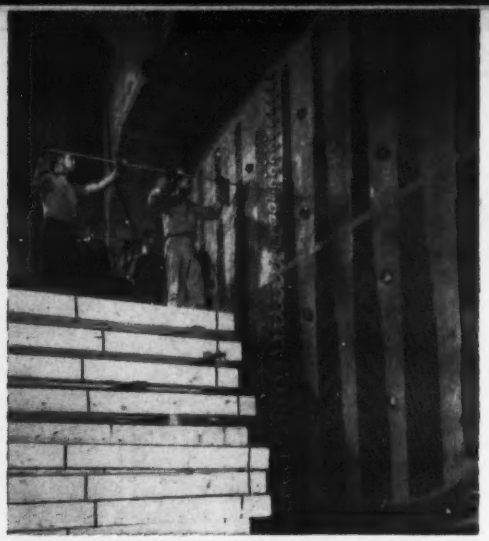
Light weight
Good workability
High thermal and electrical conductivity
Great strength in alloys
Nonmagnetic, nonsparking characteristics
Nontoxicity
Good reflectivity
Clean, attractive appearance
Low cost



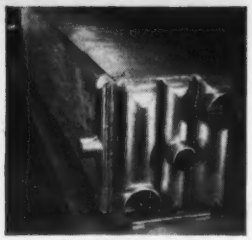
Study the next three pages to discover a few of the many process industries' uses of Alcoa Aluminum which insure outstanding metal performance . . . unhampered by corrosion. See why these various uses of aluminum have already helped hundreds of others . . . and can help you!

ALUMINUM COMPANY OF AMERICA

When inquiring check 5692 opposite last page



This brazed aluminum assembly, weighing nearly 900 pounds, is typical of exchangers used in air separation plants and other low-temperature exchange processes.



A 105,000 sq ft surface condenser with Alcoa aluminum heat exchanger tubes.

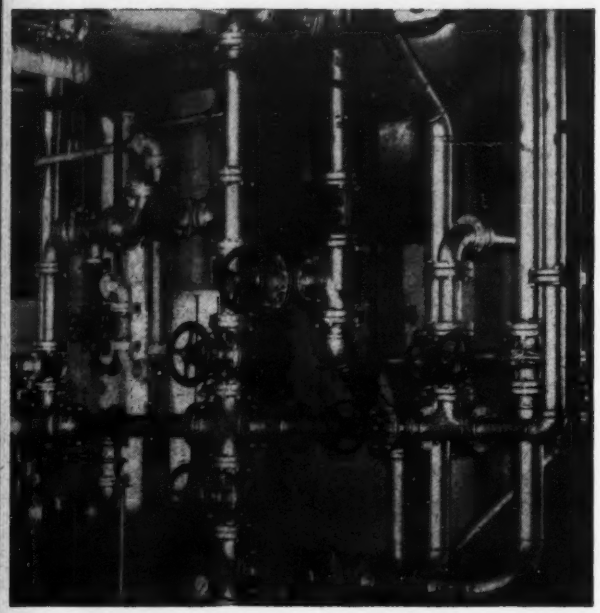
heat exchanger tubes

Aluminum heat exchanger tubes are low in cost, resist oxidation and other chemical attack, are easy to fabricate, have excellent thermal conductivity and freedom from embrittlement at low temperatures.

Aluminum tubes have demonstrated their ability to give long, dependable service under severe conditions. They are used extensively in exchangers for handling hydrogen peroxide, nitric acid, hydrogen sulfide, ammonia, naval stores, glycerine, scrylonitrile and other chemicals. Alclad tubes are recommended for use with natural cooling waters.

Aluminum costs approximately ½ the cost of admiralty, less than ⅛ the cost of stainless, and in the common ¾" and 1" sizes, less than mild steel.

Get detailed information on Alcoa aluminum heat exchanger tubes in booklet AD186, available on request.



process piping

Corrosion resistant Alcoa aluminum pipe is widely used to carry liquids and gases in chemical, petrochemical, petroleum and food processing plants. It resists attack by the materials carried as well as by the corrosive atmosphere often encountered around such plants. And it prevents product contamination or discoloration.

Aluminum pipe is available in all of the normally produced schedules. It is by far the lowest priced corrosion resistant pipe available. For example, schedule 40 aluminum pipe is ¼ the cost of schedule 5 stainless, 1/7 the cost of schedule 40 stainless.

Write for *Aluminum Pipe and Fittings* booklet, AD197.

◀ Alcoa aluminum pipe proved ideal to solve corrosion and product contamination problems in this processing plant.

unitrace*

Alcoa now offers a new and improved design of Unitrace, the unique aluminum steam-traced pipe which incorporates the steam line as an integral part of the pipe. Extruded as a single unit of aluminum, from Alcoa 3003-F alloy, Unitrace is available in diameters equal to 1½", 2", 3" and 4" pipe.

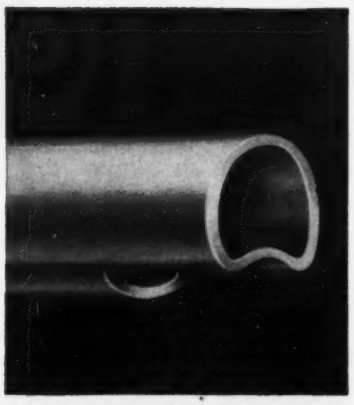
Special cast Unitrace flanges and fittings are available in alloy A356-T6 for efficient joining of sections. In many installations, flanging is not required, as sections of Unitrace can be joined easily by welding.

Preformed insulation will fit Unitrace although thermal insulation is unnecessary in many cases.

For detailed information, write for Bulletin AD418.

*Registered trademark

New type Unitrace section showing trace line cut back for joint. (Right) Special cast Unitrace flange for easy, efficient joining of new type Unitrace sections.



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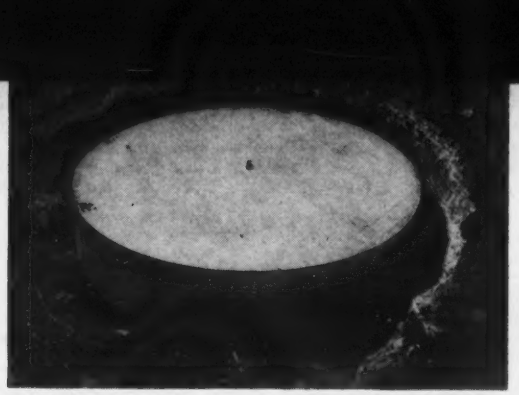
◀

ALUMINUM COMPANY OF AMERICA



World's largest all-aluminum tank stands 26 feet high, has a diameter of 128 feet, holds 2½ million gallons of 83% ammonium nitrate solution.

standard and special storage tanks

Alcoa standard storage tanks, fabricated of 3003 alloy, are supplied in sizes ranging from 5,800 to 21,400 gallons. Both horizontal and vertical construction are available.

Made from stocked components, these standard tanks bring the user all the advantages of Alcoa Aluminum at lower cost, with faster delivery.

Storage tanks to meet many special requirements may be constructed of Alcoa sheet and plate. Information on design and fabrication will be furnished on request. Write for *Alcoa Standard Storage Tanks* Bulletin, AD387.

Alcoa Standard Tanks provide storage economies for a wide variety of chemicals.

shipping containers

Alcoa offers a wide variety of shipping containers conforming to ICC regulations. Ranging in size from 7½ to 110 gallons, they are used to ship such diverse products as beer and fuming nitric acid.

Alcoa aluminum containers are lighter in weight than containers of other suitable materials, are less expensive and give longer service.

roofing, siding, structurals and paint

Alcoa industrial building sheet is used for roofing and siding on plant buildings and to protect conveyors and other outdoor equipment. The aluminum surface requires practically no maintenance and lasts well even when exposed to corrosive atmospheres often encountered around processing areas. It is easily installed and helps to keep construction costs low.

Alcoa also supplies structural shapes for use in construction where their corrosion resistance and consequent low maintenance cost are advantageous.

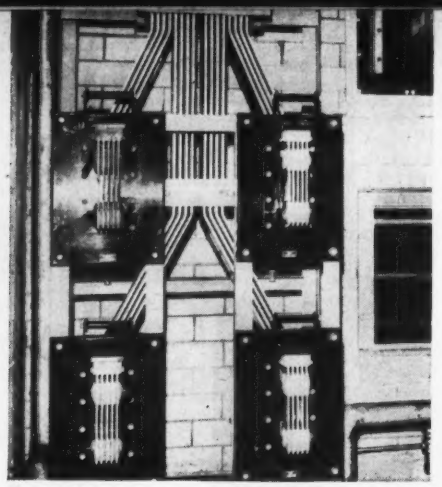
Paints pigmented with Alcoa Aluminum provide a continuous metallic sheet of pure aluminum for unmatched protective power.

Write for *Alcoa Industrial Building Products* booklet, AD285, *Alcoa Sandwich Walls* booklet, AD625, or *Painting With Aluminum* booklet, AD228.

Aluminum exterior surfaces for buildings and conveyors provide pleasing appearance with minimum maintenance.

For more information on product at right, specify 5694 see information request blank opposite last page.

ALUMINUM COMPANY OF AMERICA



bus bars

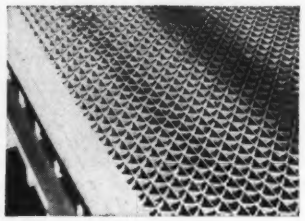
Lowest cost per unit current capacity and good corrosion resistance are key advantages for aluminum bus bars in process plants. Write for Alcoa Bus Conductor Handbook, AD661.

grating and tread plate

New grating-type Alcoa aluminum stair treads require no paint . . . are available in all standard sizes at a price competitive with galvanized steel and abrasive nosing. (Write for Bulletin AD679.)

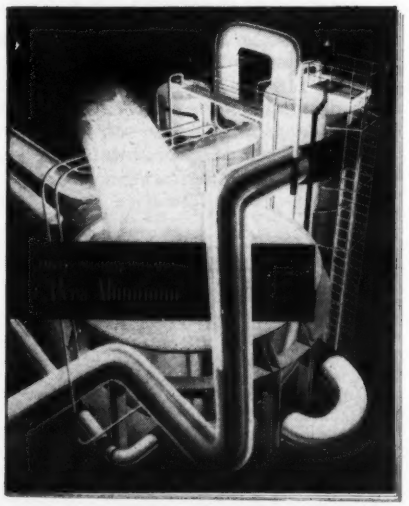
Aluminum grating is used widely for floors and walkways in and around processing plants because of its light weight, resistance to corrosion, low maintenance and nonsparking characteristics.

Alcoa supplies both a standard aluminum tread plate and Alcoa Abrasive Tread Plate. The latter has a self-renewing, bonded abrasive surface for extra nonskid protection. (Write for Bulletin AD596.)



this free book

. . . can be your dependable guide to solving corrosion problems in the process industries. Send for it now. Its 80 pages are filled with definitive data on the behavior of aluminum with specific materials . . . along with detailed design and specification information. Your copy will be sent promptly. Ask for Process Industries Book, AD460.



use Alcoa engineering assistance to solve your corrosion problems

In the course of many years' study of corrosion problems, Alcoa has acquired an immense fund of practical, nonconfidential information on corrosion characteristics of many materials and processes under various conditions. This information is available to you without obligation. Simply write Alcoa.

To insure receiving the most useful information, state your problem as specifically as possible. Alcoa's development engineers will then supply and help you evaluate the best available information.

Alcoa is also prepared to undertake cooperative testing programs in certain cases where existing data is insufficient. Contact your nearest Alcoa sales office for details.

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902-J Alcoa Building, Pittsburgh 19, Pa.
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ALUMINUM COMPANY OF AMERICA

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

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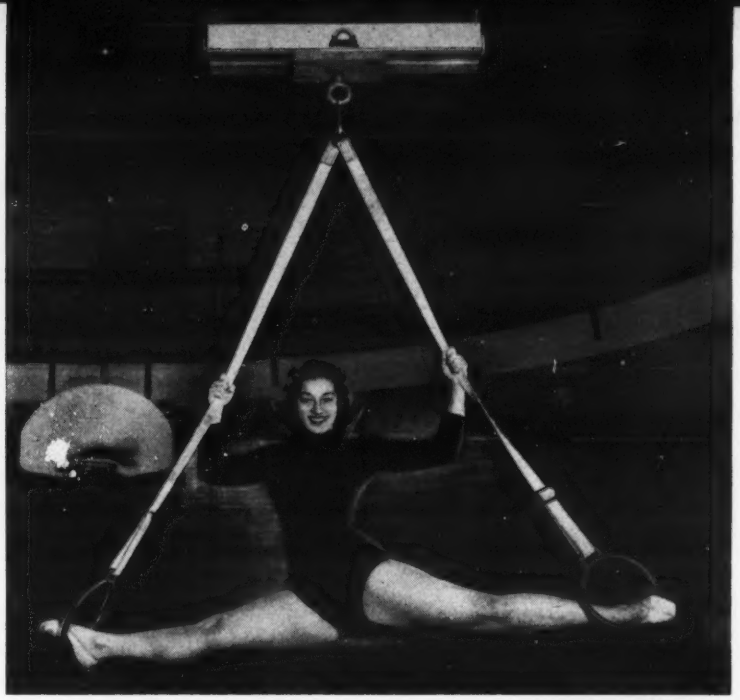
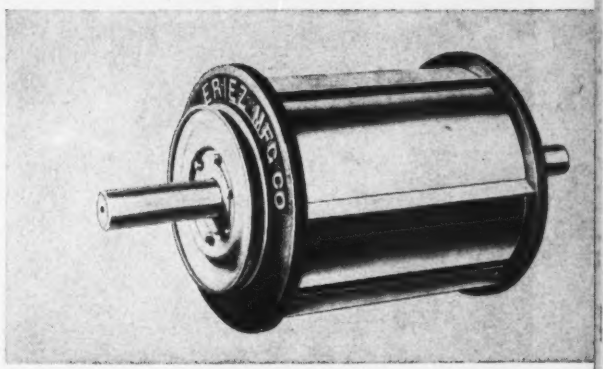
Magnetic ideas from ERIEZ



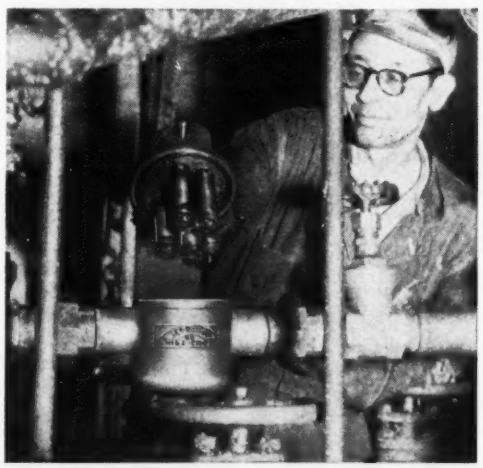
THE DARING YOUNG GAL ON THE ERIEZ TRAPEZE. Though she swings through the air with the greatest of ease, this pretty aerialist has nothing to worry about. Her rigging is held securely by an Eriez HI-POWR magnet, hung from the ceiling of the gym. This idea of herculean magnetic power has found a practical use in industry, where magnetic separators are used in processing lines to remove tramp iron that could cause fires, machinery damage and product contamination. *All Eriez HI-POWR Magnets are non-electric, self-contained. They operate without any wires or attachments. Their magnetic power lasts a lifetime. The first cost is the only cost.*

ERIEZ HI-POWR MAGNETIC SEPARATORS

ERIEZ HI-VI VIBRATORY EQUIPMENT



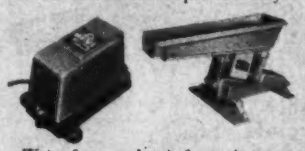
YOU CAN'T BEAT THIS DRUM. The self-cleaning Eriez Permanent Magnetic Drum is an unbeatable unit for automatically extracting tramp iron from materials conveyed in spouts, chutes, spiral conveyors, etc. Consisting of units with or without housing, the Eriez HI-POWR Drum is a revolving shell inside of which are powerful Alnico V elements which pull tramp iron from wet or dry material, thereby preventing possible fires or machinery damage . . . and assuring a contamination-free product. For more information on this product, request Bulletin B-601.



FABULOUS FERROTRAP FINDS FINES. Installed in a processing line handling a viscous liquid, this Eriez Magnetic Ferrotrap catches even the most minute particles of unwanted iron. Located just ahead of the mechanical filters and high pressure pumps, the Ferrotrap has eliminated pump and filter failure caused by iron contamination in the liquid. It has also cut maintenance costs by greatly reducing corrosion. Available in standard or sanitary models, Ferrotraps are ideal for removing microscopic fines from liquid lines where product purity is of prime importance. Ferrotraps can be installed in any position, to avoid sump effect. Magnetic element is quickly and easily removed for cleaning.

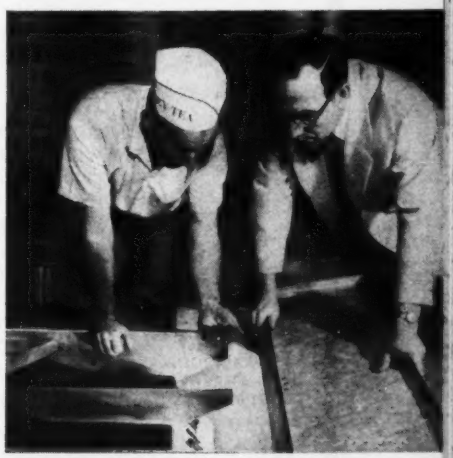
New! Eriez HI-VI VIBRATORY EQUIPMENT

First complete line of electro-permanent magnetic vibratory equipment operating at 3600 CPM directly off an AC line. No rectifier needed! . . . just plug in. Greater vibratory output with less power consumption. Less maintenance; lower installation costs. Permanently powered guaranteed Alnico V magnetic element (heart of the unit) produces an exclusive "double action" drive for more productivity.



Write for complete information on HI-VI Unit (bin) Vibrators to keep bulk materials flowing freely. HI-VI Vibratory Feeders for accurate, controlled feed.

Patent Pending

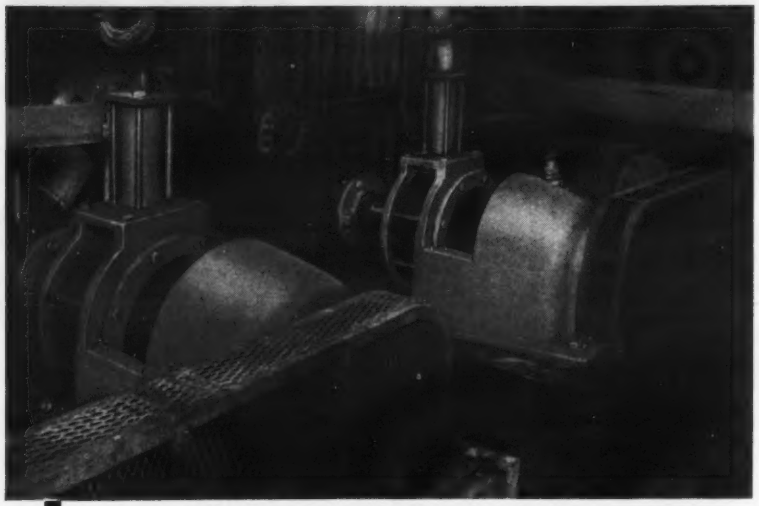


A POUND A DAY KEEPS THE REPAIRMAN AWAY. A 36" Eriez HI-POWR Plate Magnet at the Tetley Tea Company plant picks up about a pound a day of nails, bolts, screws and other tramp iron. The Eriez installation protects the bag machinery . . . *and* is saving about $5000 a year . . . *and* is saving about 200 manhours annually . . . *and* is increasing production! Besides the Plate Magnet shown, four other efficient Eriez Magnets have been in operation at the famous tea plant protecting product purity since 1950.

Eriez' free booklet "Magnetic Ideas" can help you. Send for it without obligation, ERIEZ MANUFACTURING COMPANY, 73-W Magnet Drive, Erie, Pa. OR on your specific request Eriez factory-trained field men backed by Eriez' laboratory and engineering know-how, will be happy to study your particular problem, make a plant survey and offer helpful "Magnetic Ideas".

For more information on product at right, specify 5696 see information request blank opposite last page.

Impervite IMPERVIOUS GRAPHITE Chemical Pumps

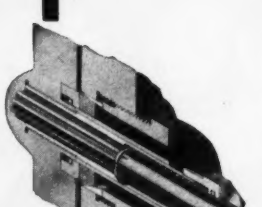


...REDUCE COSTS at Durez Plastics Division Hooker Electrochemical Co.

Fourteen IMPERVITE chemical pumps are in operation at the North Tonawanda plant, handling hot mixtures of phenol, chlorobenzene, and benzene as well as hot and cold muriatic.

Under conditions of continuous operation, these pumps may run for months with no maintenance other than an occasional adjustment of the seal adjusting nut.

Mr. Littler, Maintenance Engineer for this plant, states, "Over the past 3 months, the total expense for material and labor on *all* of these IMPERVITE pumps was only $23.00."



VIRTUALLY LEAK PROOF IMPERVITE PUMP SEAL

IMPERVITE chemical pumps are single stage centrifugals, and utilize a new self-cooling and self-lubricating seal which is virtually leakproof. Six standard models are available from stock, and specials are furnished in capacities to 1000 gpm.

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TABLE I-a

PROBABLE RELATIVE ENZYME REACTION RATES IN ACCLIMATED ACTIVATED SLUDGE

REACTION	REACTION SITE	RELATIVE RATE*
HYDROLYSIS		
$R\text{-}SO_4Na \xrightarrow{+H_2O} R\text{-}OH + NaHSO_4$	ALKYLSULFATE	100
$RCON(R')(R'') \xrightarrow{+H_2O} RCOOH + HNR'R''$	SULFONATED AMIDE	100
$RCOOR' \xrightarrow{+H_2O} RCOOH + R'\text{-}OH$	SULFONATED ESTER	100
FISSION		
UNSATURATED ALIPHATIC	OLEATE	88-96
BENZENE RING	BENZENE	22

* OXYGEN UTILIZATION FOR β OXIDATION IN SATURATED ALIPHATIC ACID CHOSEN AS BASIS OF COMPARISON

In view of recent changes in the nature of materials reaching our surface waters, it may be necessary to re-appraise currently accepted procedures of determining stream pollution. Conventional B.O.D. and C.O.D. measurements fail to give a true picture because of . . .

R. H. BOGAN,
Associate Professor
Sanitary Engineering
University of Washington

Water quality standards are supposed to be clear cut and definitive. Unfortunately, currently accepted practices of measuring water pollution do not always meet these requirements. Stream pollution standards as they exist today are a mixture of rigorous limits of an exact nature on one hand, and broad generalized requirements on the other.

It has become common practice to prescribe limits for pH, D.O., phenol, cyanides, and chromium, etc., with the same sense of confidence and reality as such values as C.O.D., B.O.D., tastes, and odors, etc. There appears to be no middle ground. What escapes the dragnet of conventional concepts and analyses does not exist!

During recent years there has been a marked increase in the use of synthetic organics in plants and homes. More and more of these chemicals are finding their way into receiving waters. Reports of zero B.O.D. organics, of persistent substances such as synthetic detergents, and the finding of numerous organic substances in domestic water supplies raises some interesting questions concerning stream pollution criteria.

Tests have shown that many types of organics persist in receiving waters for extended periods of time. Obviously, any material that persists in a stream is as important as one that undergoes rapid biochemical degradation. Little attention has been given to the effects of the compounds formed by attenuation of wastes after they enter the stream. Experiments indicate that these secondary compounds often are more toxic than the originals.

Limitations of B.O.D. and C. O. D. Measurements

One of the most serious theoretical misinterpretations stems from attempts to explain events taking place in a B.O.D. bottle by monomolecular reaction kinetics. While the following simple expression

TABLE I-b

PROBABLE RELATIVE ENZYME REACTION RATES IN ACCLIMATED ACTIVATED SLUDGE

REACTION	REACTION SITE	RELATIVE RATE*
TERMINAL β OXIDATION		
RC-OH $\xrightarrow{1/2\,O_2}$ RCOOH	ALIPHATIC ALCOHOL	67-100
$-H_2C-CH_3 \xrightarrow{3/2\,O_2} -H_2C-COOH$	ALIPHATIC TERMINAL	37
	AROMATIC ALKYL TERMINAL	33-38
	AROMATIC ALKYL SIDE GROUPS	10-33
β OXIDATION		
ALIPHATIC CARBON CHAIN	n-ALKYLBENZENE SO_3H	100
	STEARATE	100
	n-ALIPHATIC ALCOHOL	100
ETHER LINKAGE	ETHOXY POLYGLYCOLS	67-83

* OXYGEN UTILIZATION FOR β OXIDATION IN SATURATED ALIPHATIC ACID CHOSEN AS BASIS OF COMPARISON

Biochemical degradation products — a new dimension in stream pollution

$$\frac{dL}{dt} = -KL$$

has found widespread practical use, it does not follow that the biochemical conversion of organics behaves in this manner. The analogy between ultimate B.O.D. "L" and organic food material has led many to an erroneous concept. It has become common to consider residual B.O.D. at any time as due to an unused portion of the original food material present at the start. In other words, the B.O.D. reaction proceeds by assimilation of whole molecules of the original organic material present.

Thus one molecule of food is converted to CO_2, H_2O, or cell tissue before the next is used. In the case of readily assimilated substances such as simple sugars, something approaching this appears to take place. With the more complex organics, evidence points to something different.

Attempts to correlate B.O.D. and C.O.D. values are a good example of the inadequacy of the concept of whole molecular conversion. If the B.O.D. reaction was as described by the monomolecular reaction equation, then it should be possible to calculate B.O.D. values from C.O.D. data, or vice versa. With a few exceptions this has not been possible.

Obviously there is more involved than a straight forward molecule-by-molecule destruction. There is considerable evidence which indicates that the so-called B.O.D. reaction is a complex step-wise procedure.

While it is possible that many simple substances can be completely assimilated by one species of micro-organism, it is equally probable that many organics are destroyed in a series of symbiotic steps. Termination or interruption of a symbiotic type of relationship results in the production or accumulation of partially degraded by-products. Many such events have been recognized in nature. In fact, whole industries have been built on the use of biochemical production of organics. The possibility of such events occur-

Turn to next page

This Gaylord corrugated bulk pack carries twenty 100 lb. slabs of wax.
GROSS WEIGHT 2093
TARE WEIGHT 45
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Speedline® Fittings Cut Process Piping Costs

DESIGN FEATURES ALSO SOLVE CORROSION AND LEAKAGE PROBLEMS at CHAPMAN CHEMICAL COMPANY

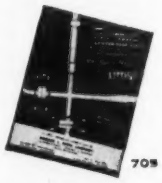
Process lines at Chapman Chemical Company, Memphis, Tennessee, manufacturers of wood preservatives, agricultural and industrial chemicals.

"Easiest, most economical means to assemble leak-proof, stainless steel process lines", says D. B. Smith, chief engineer at Chapman Chemical Company. Thanks to the "tangential" feature of Speedline fittings—which permitted on-the-job selection of joints with or without welding—labor time and costs were cut to a minimum. Corrosion and leakage problems common to conventional fittings were also eliminated on stainless steel reactor lines used in the manufacture of ester resins. Speedline features offered other important advantages throughout the installation.

- System provided positive corrosion *and* heat resistance to handle low concentration of sulphuric acid . . . other solutions at temperatures up to 500° F!
- Simplified construction of multi-purpose system manifold, because exclusive "tangential" feature—an extra straight section on *every* end of *every* Speedline fitting—permitted flanging *without* welding!
- Aligning connectors speeded installation and insured leak-proof joints, where welding was required.
- System allows for easy modification of existing lines to meet future process piping requirements.

Only Speedline corrosion-resistant fittings, designed especially for use with economical, light wall Schedules 5 and 10 stainless pipe, provide these time and cost saving advantages not possible with conventional fittings.

How the design features of Speedline fittings can help solve *your* process piping problems is described in a fully illustrated data book available on request. Write today for a copy of Speedline Catalog at no obligation . . . or contact the Speedline distributor nearest you.



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Stream Pollution

Starts on page 160

ring in biological treatment units and in receiving waters should not be overlooked.

Experimental Results

Considerable research has been conducted by the author on this subject. A number of related organics have been studied in addition to major types of synthetic detergents. Included were alkanes, high-molecular-weight fatty acids and alcohols, low-molecular-weight ethylene glycols, and a number of alkyl benzenes.

The findings of this research indicate that B.O.D. values observed for many substances may be related to degradation of a portion of the molecule only. In the case of alkyl benzene sulfonates, much of the oxidation appears to be centered in the alkyl groups. Presence of oxidized alkyl derivates were detected by infrared spectroscopy.

Biochemical oxidation does not necessarily have to continue to be centered in the original molecule. Through such operations as hydrolysis and fission the original organic may be converted into two or more fragments. Some of these derivatives may be easily oxidized. Others may persist for considerable periods of time. Conditions below many waste outfalls might be described in terms of a unique fractionating mechanism — with biochemical oxidation products extending downstream in relation to their persistence and sequence of formation.

Conclusions

On the basis of the foregoing considerations and of the experimental results obtained, the folowing conclusions have been drawn:

1) Organic stream pollutants often cannot be adequately evaluated in terms of B.O.D. or C.O.D. values alone. There is nothing in the B.O.D. tests which allows descriptions of residual organics which may be present after periods of biochemical oxidation.

Turn to page 164

65 belt hp!
up to 15,500 lb drawbar pull!
forward speeds from 1.5 to 5.5 mph!
reverse to 4.1 mph!

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HD-6

Tractor-Dozer

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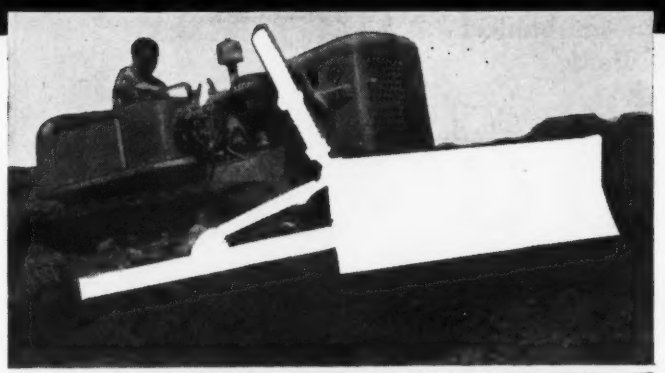

Only dozer of its size with these basic advantages . . . engine-mounted rams, long push beams, fewer linkage points (only 2 instead of 5 or 6). These big-dozer features all combine to provide more accurate, gouge-free dozing . . . longer equipment life.

Convenient rotary-valve blade control makes the HD-6 the easiest handling dozer of its size. With more than 5½ feet of track on the ground, it has outstanding flotation . . . yet turns easily in any terrain. The HD-6 also combines large, low-set front idlers with a blade snugged close to the radiator guard . . . to provide balance that means better dozing, more work done under any conditions!

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This illustration is an authentic engraving of an alchemist's laboratory used for distilling in Holland in the 1600's. Furnaces, stills, and alembics did their work; while the master compounded mixtures in crucible. For your free copy (11" x 15") of this reproduction, write on your company letterhead stating name and title.

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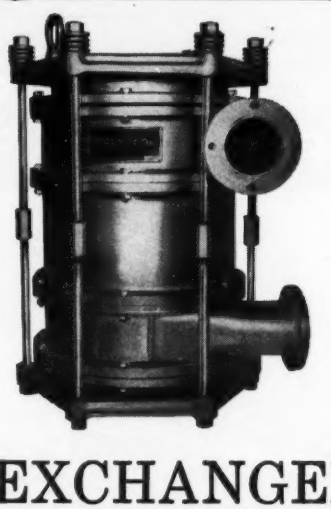
No cemented joints
Freedom from mechanical and thermal shock



polybloc
GRAPHITE HEAT EXCHANGER

Write for 14-page Engineering Manual

The "Polybloc" Graphite Heat Exchanger is constructed of high strength, molded graphite blocks which are impervious to acids, alkalis and solvents. These stacked blocks are held in compression by external spring loaded tie bars to insure ruggedness, freedom from shock and leakage. In addition, this construction eliminates the need for cemented joints or fragile tubes.

Quick Delivery • Guaranteed Performance • Designed to Meet Your Specifications

THE CARBONE CORPORATION BOONTON, NEW JERSEY

When inquiring check 5702 opposite last page

Stream Pollution

Starts on page 160

2) Biochemical degradation intermediates or by-products have been demonstrated during the breakdown of oils and alkyl benzene sulfonates. The possibility of their production from a number of other souces exists.

3) Oxidation of an organic may be related to only a portion of the original molecule. Through hydrolysis and fission a substance may be broken into two or more fragments. It is entirely possible that certain fragments may be relatively resistant to oxidation whereas others may be rapidly oxidized.

4) Many consecutive enzyme reactions may be involved in the degradation of an organic. Some of these reactions have been found to take place at widely differing rates (see charts). Evidence indicates that certain enzyme reactions, such as fissioning of the benzene ring, may regulate the rate at which a substance can be oxidized. Biochemical degradation products may be caused to accumulate at such reaction points.

(Based on paper presented at 1957 Purdue Industrial Waste Conference, Purdue University, Lafayette, Indiana.)

Gamma rays control titanium furnace

Hold ingot level to within 1/100" of ideal position

Gamma rays are being used to detect and control level of molten titanium in titanium arc furnace at the Westinghouse metals development plant, Blairsville, Pa. System is so precise that it can detect and maintain level of the titanium ingot to within 1/100" of its ideal operating position.

Temperature of the liquid titanium is more than 3000°F. Gamma rays pass through walls of furnace and the 12" titanium ingot inside it — passing through as much as 15" of metal.

Source of rays is a small

needle of cobalt-60, located outside furnace and in line with top surface of ingot. Rays passing through furnace are detected by two scintillation counters. Each counter contains a crystal which changes gamma rays into flashes of light. Counter then converts light in electrical impulses, and amplifies them.

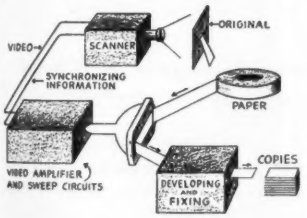
Amplified pulses are fed to electronic circuits which drive hydraulic system that raises or lowers ingot to exact position. If ingot moves beyond prescribed limits, gamma-ray control causes immediate shutdown of furnace.

(Information courtesy of Westinghouse Electric Corp., Dept. CP, Pittsburgh, Pa.

Three pages a second reproduced by video in duplicator

System could produce copies at distant locations

Prototype of an electronic office duplicating device is capable of duplicating from original text of elite type at



rate of 17,000 characters (equal to three 8½ x 11" sheets) per second. System consists of video scanner and amplifier circuits combined with a printing unit which can be remotely located.

A specially designed TV camera scans the document, and the resulting signal is transmitted to receivers through a coaxial cable, or it can be broadcast as a TV signal. An electric charge pattern is deposited on copy paper in the receiver. Paper is mechanically dusted with black powder which clings to charge on paper's surface. Powder is heated and pressed

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OUTSTANDING PHYSICAL PROPERTIES

VISTEX* with TEFLON** Gasketing Material

Another first for American! The exceptional thermal and chemical properties of Teflon are combined with low, cold flow characteristics to give you a gasketing material never before available.

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With thermal stability up to 420F. Vistex with Teflon eliminates undesirable lateral plastic flow with excellent stability to corrosive gases, liquids and virtually all chemicals at low and high temperatures.

Vistex with Teflon, with tensile strength of 5,000 psi, has very high tear value, will not ravel or fray, has very good cutting properties. Seals with minimum pressure on polished or irregular surfaces.

American's engineering and research staff is prepared to supply you with complete data and product recommendations. Write today on your company letterhead.

*VISTEX—Reg. Trade-mark of American Felt Company
**TEFLON—Reg. Trade-mark of DU PONT for its Tetrafluoroethylene resin.

American Felt Company
TRADE MARK

SALES OFFICES: New York, Boston, Chicago, Detroit, Cleveland, Rochester, Philadelphia, St. Louis, Atlanta, Greenville, S. C., Dallas, San Francisco, Los Angeles, Portland, San Diego, Seattle, Montreal.—PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I.—ENGINEERING AND RESEARCH LABORATORIES: Glenville, Conn.

GENERAL OFFICES: 96 GLENVILLE ROAD, GLENVILLE, CONN.

When inquiring check 5703 opposite last page

Does your work concern protective coatings?

from **carboline**

handy gauge measures wet film thickness of protective coatings

Ordinarily, the final thickness of a protective coating is unknown until the coating has cured, or dried. Then it is often discovered too late that the film is too thin. The result? An additional coat must be applied or the coating fails prematurely. Either way, it is costly and inconvenient.

But now you can avoid such trouble, with this new contribution to Carboline's Engineering Approach to corrosion protection. This precision-ground gauge allows you to accurately measure (.0015" tolerance) **wet** film thickness **during** application, determine final dry thickness, and make any necessary adjustments **immediately.**

If your work concerns protective coatings, request this essential gauge (one per request while our supply lasts). There is no obligation.

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Manufacturers of PHENOLINE, POLYCLAD, RUSTBOND PRIMERS

Specialists In Corrosion Resisting Coatings and Linings

333 Thornton Ave., St. Louis 19, Mo.

When inquiring check 5704 opposite last page

into paper to make a permanent record.

This potential communications boon would permit instantaneous transmission of documents from a central location to an unlimited number of printer units. Sytem is designed to occupy about same space as current duplicating machines.

(Electronic duplicator was developed for A. B. Dick Co., Chicago, Ill. by Stanford Research Institute, Dept. CP, Menlo Park, Calif.)

Waste plant benefits community, industry; shows cooperation

Biological plant will purify chem wastes, treat sewage

American Cyanamid is constructing a $4.5 million secondary sewerage plant adjacent to its Organic Chemicals Division at Bound Brook, N. J. According to company, the plant, when completed, will be one of the largest biological industrial waste treatment plants in the world.

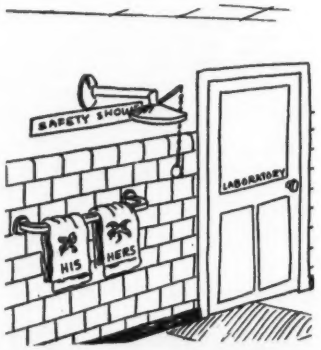
It will further treat and purify company's wastes before they enter the Raritan River, and give secondary treatment to domestic sewage of three neighboring municipalities.

State and local officials have expressed admiration for the fine example of industry-community cooperation exemplified in the manner in which Cyanamid and the Somerset-Raritan Valley Authority have worked together to solve pollution problems. The Cyanamid plan will not only save the authority from building its own secondary treatment facilities, but will make possible lower annual charges to municipalities, resulting in substantial savings to taxpayers.

Nearly four years of intensive development work was conducted by American Cyanamid to determine best treatment method. Plant wastes come from 800 different chemical operations in which approximately 20 million gal of water are used and returned to the river daily.

Because of its high efficiency, the activated sludge process was selected. Treatment plant will consist of six aeration tanks with 20 million gal total capacity, six final settling tanks, and complete facilities for laboratory and pilot plant work.

(Information courtesy of Organic Chemicals Div., American Cyanamid Co., Dept. CP, 30 Rockefeller Plaza, New York 20, N. Y.)



Thanks to Sherman L. Peeno, Proctor & Gamble, Cincinnati

Metallo-organic polymers made by new method

A technique for the synthesis of organic-metallic polymers is being studied in which the starting material is a preformed polymer. The polymer is synthesized through use of gamma irradiation. The polymer is then treated with acid and subsequently with a metal hydroxide to produce the metallic polymer.

Technique permits preparation of organic polymers with a wide variety of metals. The metals are chemically bound into the polymer which makes the system homogeneous. Polymers of uranium, lead, lithium, iron have been prepared. Weight composition of metal can be as high as 60% for the heavier metals.

Fact that polymers are completely homogeneous even at

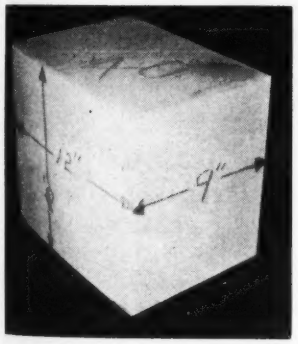
maximum metal content suggests uses as moderator-fuel elements in the case of the uranium polymers and shielding materials for some of the other metallo-organic polymers.

(Organo-metallic polymer research is being conducted at Nuclear Division, The Martin Company, Baltimore, Md. . . . or for more information check 5705 on form located opposite last page.)

Polyethylene block serves as shielding for nuclear reactors

Linear polyethylene block has been developed for use as secondary shielding on nuclear reactors. Made of high-temperature, high-tensile polyethylene, the blocks are lightweight and compact, making them particularly desirable for mobile reactors.

Block measures 10x12x9", weighs 40 lb, and is free of all voids. Material can be compounded with metallic



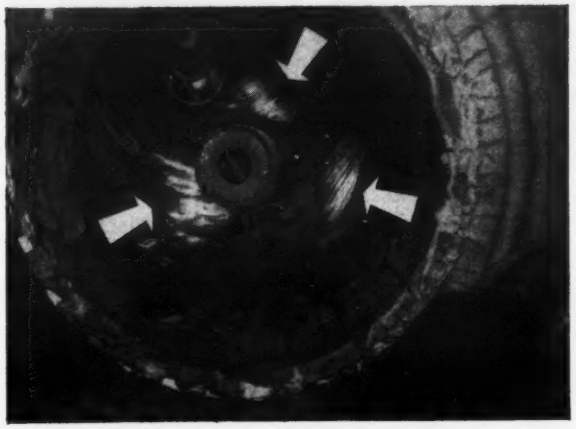
boron to further enhance its neutron shielding characteristics.

In addition to blocks, the linear polyethylene can be formed into rods, sheets, and shapes for various applications in the chemical industry. Heat distortion temperature is 250°F under no load.

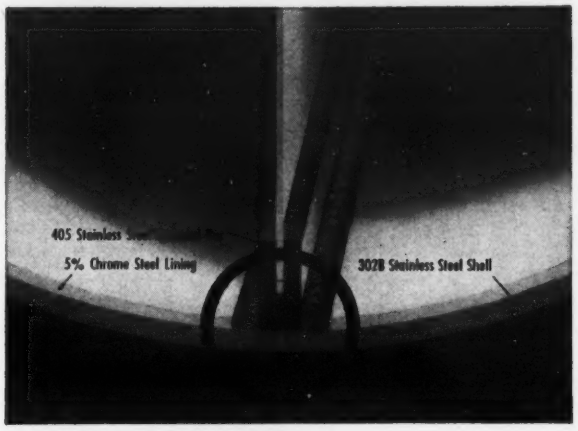
(Linear polyethylene blocks are product of American Agile Corporation, Dept. CP, 5461 Dunham Road, Maple Heights, Ohio . . . or for more information check 5706 on form opposite last page.)

CHLORIDE CORROSION
Weld: 304 stainless to mild steel
Equipment: drag conveyor

HIGH TEMPERATURE
Weld: Inconel* nickel-chromium alloy to ordinary steel
Equipment: furnace retort



NO PREHEAT POSSIBLE
Weld: repair of cracks in carbon-molybdenum steel
Equipment: throttle valve



HIGH PRESSURE
Weld: 405 stainless to 5% chrome steel and 302-B stainless steel
Equipment: pressure vessel

Now . . . one electrode . . . Inco-Rod "A" . . . can weld 9 out of 10 combinations of corrosion-resisting alloys

"Problem" welds like these are being made successfully every day with Inco-Rod "A"* electrode.

With this versatile electrode, dissimilar alloy welds are being made without special equipment . . . without special training for weldors. Users report remarkable success with Inco-Rod "A" electrode in field welds where preheating is impossible.

Welds are highly corrosion-resisting, strong and ductile. They have high impact resistance at sub-zero temperatures and good stress rupture properties at extreme high temperatures.

Try Inco-Rod "A" electrode. See for yourself what its versatility means in lower maintenance costs and better fabricating methods.

To get a clearer idea of how you can use Inco-Rod "A" electrode, write for our new folder. It is illustrated with many case histories and contains many helpful tips on using Inco-Rod "A" electrode.

The International Nickel Company, Inc.
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*Registered trademark

Inco-Rod "A" electrode is supplied in four diameters: 3/32-, 1/8-, 5/32-, and 3/16-inch . . . packed in 5-lb. asphalt-lined containers.

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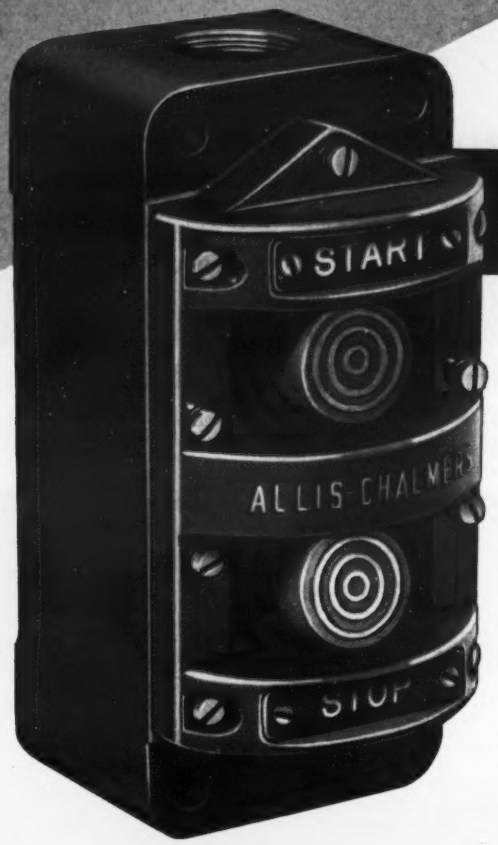
When inquiring check 5707 opposite last page



NOW
from Allis-Chalmers

Pushbutton stations designed to withstand even the most Corrosive Conditions

Here is one of the most practical developments to come along in recent years—Allis-Chalmers heavy duty pushbutton stations. From the phenolic BM-2498 enclosure to the Type 316 stainless-steel hardware, this line of pushbutton stations is exceptionally resistant to corrosive action of chemicals.

For the first time a proven-in-service, roll-action operator is completely protected by a rugged, corrosion-resistant enclosure. This assures longer, trouble-free operation in chemical plants, refineries, paper mills, or any industrial application where corrosive atmospheres normally cause pushbutton failures.

The complete line of Allis-Chalmers corrosion-resistant pushbutton stations includes:

- single or two-button units
- momentary or maintained contacts
- lockout attachment
- pilot lights

This newly designed pilot light has the same phenolic enclosure as the pushbutton stations, and is available as either single or double units. Wide angle lenses of flexible vinyl plastic have greater range of visibility, and are available in any combination of red, green, amber, blue, or white. Bayonet-type bulbs are used to resist shock. Primary voltages are to 550 volts; secondary voltage is 6.3.

For further details call your nearest A-C District Office or Distributor . . . or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5526

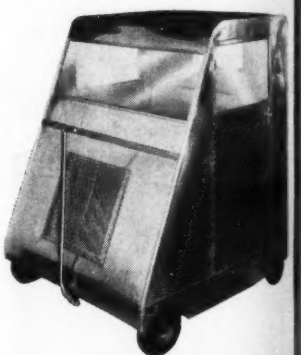
When inquiring check 5708 opposite last page

Collect real cool payoff from hot-job category in 'isolation booth'

Air-conditioned cab promotes worker efficiency

You can't get $64,000 from a session in this "isolation booth", but you can get rewarded with a cool air-conditioned respite from an extreme-heat job. Mobile, cab-type cooling compartment is designed to speed progress where operations are carried on under conditions of extreme heat. It permits workmen to take relief breaks without leaving building.

Resembling quiz show isolation booth, cooling compartment is 56″ in length, 46″ wide, and 66″ high. Cab is made of aluminum to reflect as much heat as possible, insulated, and air-conditioned by filtered air which dehumidifies as it cools.



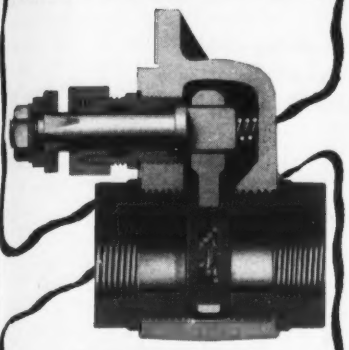
Workers get relief from hot job by taking break in cool cab

Tight-fitting door admits worker to roomy interior where he can rest on a comfortable seat behind thick glass "windshield". Temperature within cab is regulated by thermostat. Unit weighs less than 1000 lb. Mounted on four small pneumatic-tired wheels, it is easily pulled.

Although present model is two-man capacity, models to accommodate four or six people at a time will be available.

(Breeze Wagon Cooling Cab is product of Peuchen Engineering Corp., Dept. CP, 1010 Wright St., Wilmington, Del. . . . or for more information check 5709 opp. last page.)

FULL-FLOW
Okadee
VALVES
NON-LUBRICATED



POSITIVE
STOP
FOR

- Steam
- Air
- Ammonia
- CO_2
- Gasoline
- Propane
- Styrene
- Butadiene
- Lube Oils
- Jet Fuels

Available in Stainless Steel or Steel, Chemically Nickel Coated

You can select Okadee Valves for flow by pipe size — and get full-flow and positive shut-off with virtually any liquids and gases.

Quick-opening, metal-to-metal disc valves and seats require no lubrication — virtually no maintenance for hundreds of thousands of operations . . . Real valve *performance* and *service*.

FACTS AND FIGURES

. . . on Okadee Valves will be sent promptly on request. Sizes ½" to 8"; A.S.A. dimensions; screwed or flanged. Valve seats and discs Stellite or stainless steel; your choice of operators.

• Write for Bulletin CP6

Okadee COMPANY
332 SOUTH MICHIGAN AVENUE
CHICAGO 4, ILLINOIS

When inquiring check 5710 opposite last page

Does the boss die young? Can promotion kill you?

Industrial physicians interviewed in connection with recently conducted survey on executive health found no evidence that executives are in any worse state of health than other employees. One chemical company medical director reported that top management in his company seem less likely than other employees to suffer from heart disease and high blood pressure.

This viewpoint has been corroborated by figures compiled by the National Office of Vital Statistics which indicate that men of managerial, technical, and administrative level as a group have lower than average mortality rates. It has also been affirmed by the fact that life insurance companies sell policies to men in executive occupations in general at the lowest rates.

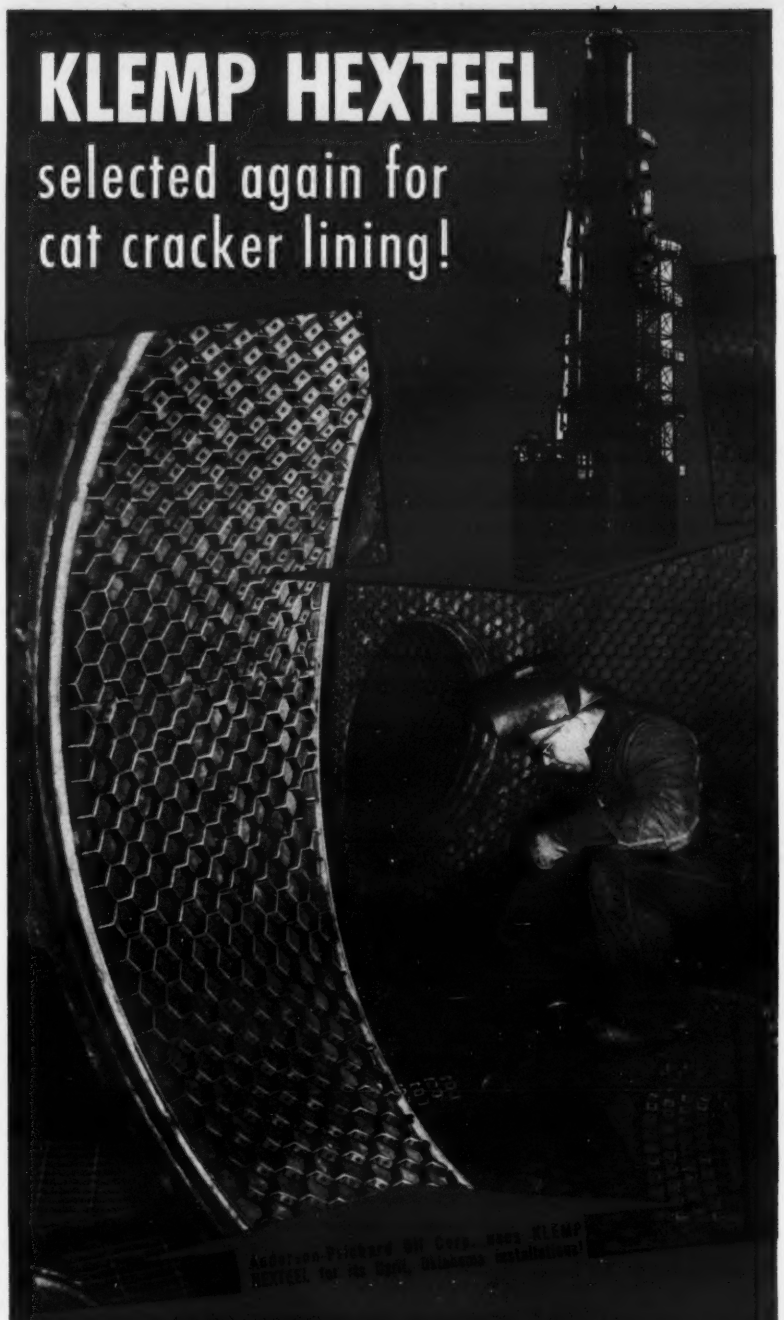
In order to examine the current status of health examination policies in industry, 847 medium-sized and large companies of all types were polled. Size ranged from below 1000 up to 500,000 employees. Of 447 companies replying, 70% require an executive to undergo a physical examination as a condition of hiring. However, only 53% offer examinations to executives already employed.

Health examinations are compulsory in 56 of the 847 companies surveyed; 132 report that the examination is optional; 40 say it is entirely voluntarily.

In general, examinations have met with excellent acceptance. Almost half the companies report 100% participation. In seven out of ten, at least 90% of eligible executives participate in the program. According to a study by Life Extension Examiners, "Executives are a reasonably healthy group of people with quite a good life expectancy."

(Reprints of executive health study may be obtained from American Management Association, Dept. CP, 1515 Broadway, Times Square, New York 36, N. Y. Check 5711 opposite last page.)

KLEMP HEXTEEL
selected again for cat cracker lining!



RETARDS ABRASIVE AND CORROSIVE ACTION

KLEMP
METAL GRATING CORPORATION

Write for free brochure today!

When inquiring check 5712 opposite last page

Chemical motors withstand chlorine and caustic, damp conditions and heat

Motors coated with special insulating varnish and having oversize bearings drive pumps that raise mercury 11′ in de Nora cell chlorine-caustic plant

GORDON WEYERMULLER,
Associate Editor

Problem: When a large chemical company was designing a de Nora cell chlorine-caustic plant, motors were required that could withstand the punishing conditions of being subjected to chlorine and caustic, dampness and heat. Besides that, motors had to be sturdy enough to drive pumps that raise mercury 11′. Remember, mercury is 13.6 times as dense as water.

Solution: In July 1953, the midwestern plant placed in service 52 chemical motors, which are treated with a special insulating varnish and have oversize bearings. One motor is used on each of the 52 de Nora cells. Each motor is totally enclosed, non-ventilated. Other specifications for motor are 2 hp, 1150 rpm, 3 phase, 60 cycle, 220/440 volt, with ball bearings. After installation, a metal cover was placed over each motor to help protect it from possible spillage from floor above.

Part motors play in plant can best be shown by a short explanation of the process. Treated, saturated brine is pumped into cell. De Nora cell uses a graphite-plate anode and rods and a flowing mercury cathode. As brine enters cell and a current is introduced, chlorine is formed, which passes off through glass and Haveg pipe to be dried, compressed, and cooled.

Sodium passes into the flowing stream of mercury as an amalgam and goes to decomposers. These units are steel tanks with broken graphite packing. Water is introduced into bottom to form 50% caustic. Process produces a high-purity caustic of 50% strength without need for evaporation. Caustic is free of chlorides and substantially free of other contaminating elements.

As mercury amalgam is freed of sodium in decomposing tower, mercury coming out bottom must be pumped back to the de Nora cell for another cycle. In

(CP Staff Photo)

Foreman checks on motor below cell room. Behind motor is decomposer

Mercury chlorine-cell room at chemical plant in the Midwest

Plant technical adviser looks down row of decomposers, each of which uses a motor and pump

(CP Staff Photo)

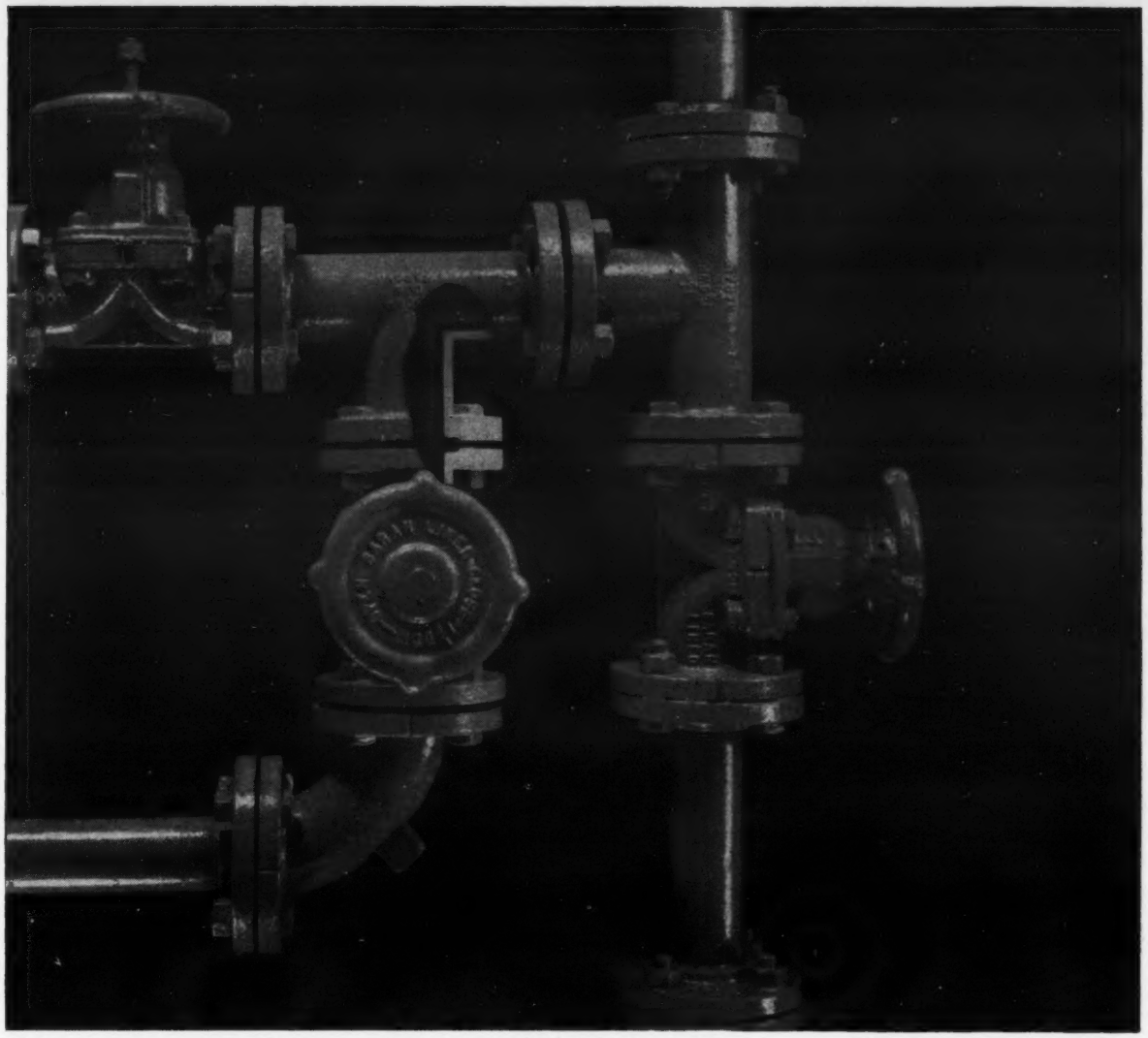
order to raise the mercury 11' each chemical motor drives a de Nora mercury pump, which is located directly below motor. This centrifugal unit operates at a rate of 8-9 gpm. Pump is very heavily designed in order to have the required head — equivalent to about 150' of water. One feature of pump that enables it to handle the load is the design of the impeller. Mercury enters interior of impeller through center and is forced out through vanes around edge.

Results. Plant has had good experience with the motors and is well satisfied with their performance during the four years of nearly continuous operation. Motors have well withstood the combination of chlorine, caustic, and damp conditions — along with corrosive gases to which they are continuously subjected. Motors run hot to touch.

(Chemical Motors are product of Century Electric Co., Dept. CP, 1831 Chestnut St., St. Louis 3, Mo. . . . or for more information check 5713 on form opposite last page.)

(De Nora mercury pumps are manufactured in the United States by Chas. S. Lewis & Co., Inc., Dept. CP, 8625 Grant Rd., St. Louis 23, Mo. . . . or check 5714.)

(De Nora cells are being sold in the United States by Monsanto Chemical Co., Dept. CP, 1700 S. 2nd St., St. Louis 4, Mo. . . . or check 5715.)



Whatever the piping arrangement, liquid never touches metal in saran lined pipe, fittings or valves.

You can see why saran lined pipe cuts costly downtime

It's a rigid steel pipe lined with durable saran that corrosive liquids won't bother

Now you can pipe commonly used acids, alkalies and other corrosive liquids without worrying about corrosion. With saran lined pipe, the liquid never touches metal – in the pipe, valves or fittings. Corrosion can't get a start—downtime troubles are eliminated.

Because it is two pipes in one, steel swaged onto saran, it has high strength. In fact, saran lined pipe will withstand working pressures up to 300 psi. Saran lined valves and fittings are available for 150-psi and 300-psi working pressures.

You'll get other advantages when you use saran lined pipe. It's easy to fabricate and easy to install. Conventional pipe fitters' tools can be used for cutting and threading. And you can hang it as you would ordinary steel pipe.

If your operation can profit from long-lasting, corrosion-free piping, investigate saran lined pipe today. THE DOW CHEMICAL COMPANY, Midland, Michigan.

SARAN LINED PIPE COMPANY
DEPT. SP1594B
2415 BURDETTE AVENUE
FERNDALE 20, MICHIGAN

Please send me information on saran lined pipe, fittings and valves.

Name_____ Title_____ Company_____

Address_____ City_____ State_____

YOU CAN DEPEND ON DOW

When inquiring check 5716 opposite last page

How to cut costs with Crane valves

30,660 operations on tough corrosive—and not a penny for maintenance

This case history may give you an idea how to save money in your own plant.

The man above is operating Crane 1-inch diaphragm valves on lines to a railroad car washer, used by the Santa Fe Railroad in its Los Angeles yards.

These are Crane No. 1631 valves with neoprene diaphragm and disc insert, and with 18-8 SMo bodies. Handling an acidic cleaning solution, these valves have been operated 12 times a day, 365 days a year for over 7 years. Yet despite the corrosive fluid, despite the long period of frequent operation, none of these Crane valves has leaked . . . none has had a diaphragm rupture . . . none has required a penny's worth of maintenance.

This is another example of how Crane research and product design help industry avoid costly valve maintenance. For information on any valve application, call in your Crane Representative.

YOU'LL WANT THIS Crane Folder AD-1942 on packless diaphragm valves. Ask your Crane Representative for a copy, or write to Crane Co. at address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

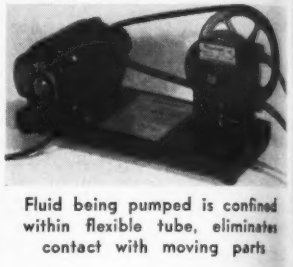
When inquiring check 5717 opposite last page

No contact of fluid with moving parts of pump

Uses: For small-scale handling of wide range of corrosive, sterile, and abrasive liquids.

Features: Design of unit eliminates all contact of moving parts with fluid being pumped.

Description: Intake and outlet of pump are one continuous flexible tube which passes



Fluid being pumped is confined within flexible tube, eliminates contact with moving parts

through pump body where it is exposed to action of rotary squeegee. Flexible tube material can be selected to suit liquid being handled. Pump action is quiet and capacity uniform.

(Pump is product of The Randolph Company, Dept. CP, 1018 Rosine St., Houston, Texas . . . or for more information check 5718 on form opposite last page.)

Thanks to Ken Boyea, Hercules Powder Company, Holyoke, Mass.

Costs reduced 25 percent on glass fiber ducts for rayon plants

Lighter weight units are installed at less cost

Lightweight, chemical-resistant ductwork made of glass-fiber-reinforced plastic replaced conventional corrosion-resistant ducts for exhausting vapors from "spinning" rooms at Cleveland and Painesville, Ohio, plants of Industrial Rayon Corporation. Manufacturer reports that replacement was made at approximately 25% less cost.

Fabricated in 25' lengths from specially molded parts and standard size flat sheet, weight of ducts is about half

Glass-fiber-reinforced plastic ductwork exhausts vapors from rayon plant "spinning" room

that of conventional units. Glass-fiber-reinforced ducts are available in various grades of chemical-resistant and flame-resistant materials, fabricated to individual specifications.

(Molded fiber glass ductwork is product of Molded Fiber Glass Sheet Company, Dept. CP, Ashtabula, Ohio . . . or for more information check 5719 on form which is located opposite last page.)

Pocket-size slide chart on machining stainless

Handy 9¼ x 4¾" slide chart gives concise data on turning, drilling, tapping, threading, milling, and reaming stainless steels. "Guide to Machining Stainless Steels" — The Carpenter Steel Company, Dept. CP, 3067 W. Bern St., Reading, Pa. Check 5720.

A New Member of the PITT CHEM Protective Coatings Family!

FAMOUS *Insul-Mastic* "Gilsonite" coatings have joined the *Pitt Chem* family of industrial protective coatings! Thus, Pittsburgh Coke & Chemical Company—through the recent acquisition of Insul-Mastic Corporation of America—now offers you the *most complete line of bituminous protective coatings on the market.* That means that you can now obtain, from one dependable, experienced source, high quality bituminous coatings specifically formulated to effectively and economically combat virtually any corrosion problem you may encounter. Now, more than ever, *Pitt Chem* is the name to remember when you want reliable corrosion protection—for *Pitt Chem* now means *Insul-Mastic,* too! Call for a *Pitt Chem* technical representative to survey *your* specific corrosion problem. A call, letter or wire will place him at your service.

PITT CHEM
Coal Tar Pipeline Enamels

Time-tested hot-applied pipeline enamels, manufactured to rigid, published specifications. Used by scores of leading pipeline companies for long-lasting protection of major underground gas and petroleum product lines.

PITT CHEM
***Insul-Mastic* Coatings**

A performance-proven family of vapor sealing and insulating asphalt coatings containing a high percentage of Gilsonite. These thick mastic coatings serve excellently as moisture and vapor barriers on insulation and other surfaces exposed to the elements above ground.

PITT CHEM
Coal Tar Coatings

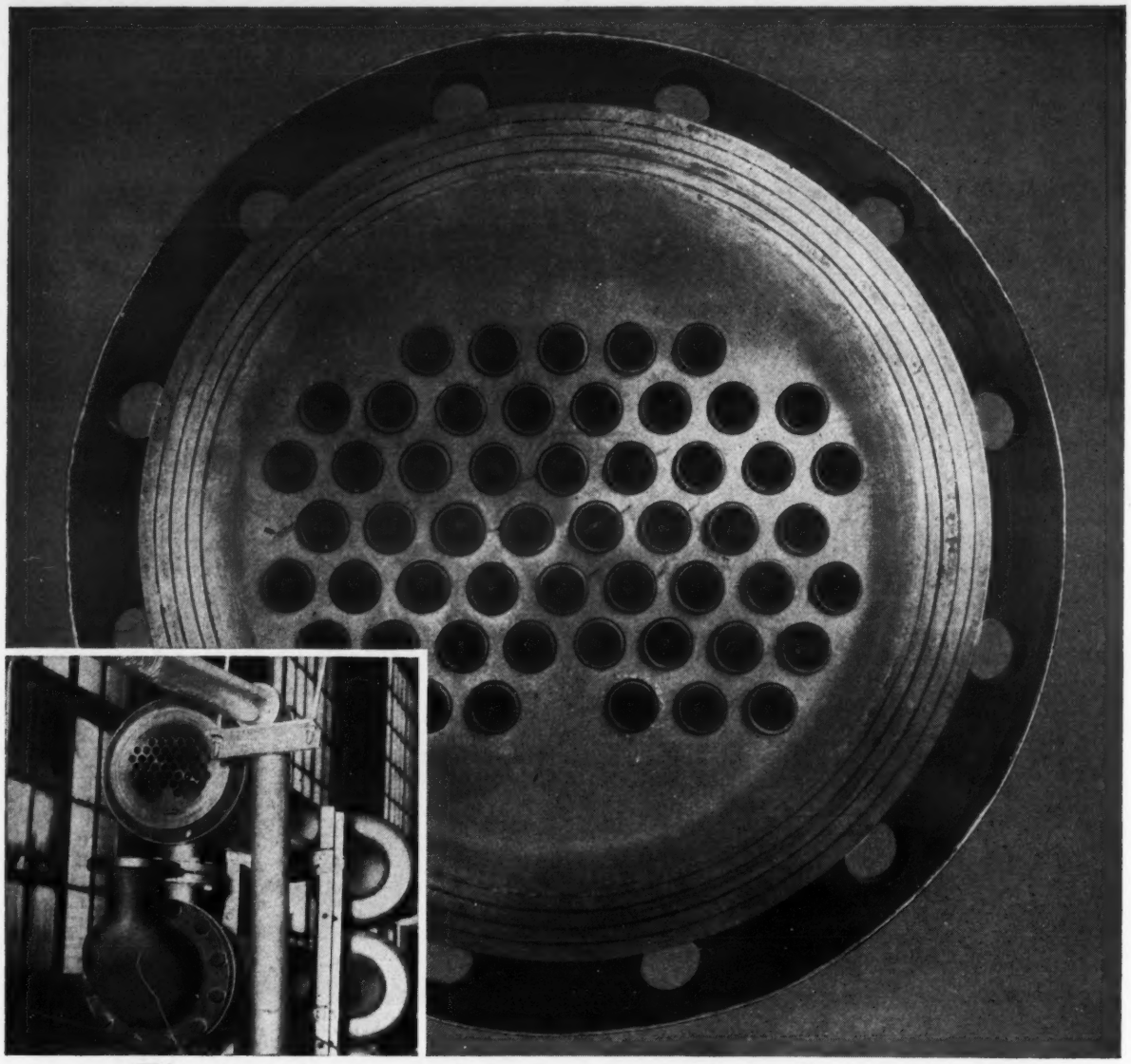
A broad family of cold applied coal tar coatings that provide excellent corrosion protection on metal, masonry, concrete or stone. Includes "*Tarset,*" the revolutionary coal tar-epoxy resin coating.

PITTSBURGH COKE & CHEMICAL CO.

WEW 6808

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

When inquiring check 5721 opposite last page



Carpenter 7Mo Stainless Tubing

No corrosion . . . no pitting after 4 years of handling hot SO_2 gases and vapors

• The smooth, clean surfaces of the Carpenter 7Mo Stainless tubing in this 3-pass Relief Gas Cooler tell the whole story. Still like new after 4 years of carrying 8% SO_2 gases and vapors from the top of a sulphite digester at temperatures in excess of 200°F. No maintenance. No replacement worries. No costly downtime.

If you have a tough corrosion problem involving stress corrosion cracking and pitting, see what Carpenter 7Mo Stainless Tubing and Pipe can do to solve it for good. Call your Carpenter Distributor for service that satisfies.

MEMBER

The Carpenter Steel Company
Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

Stainless Tubing & Pipe

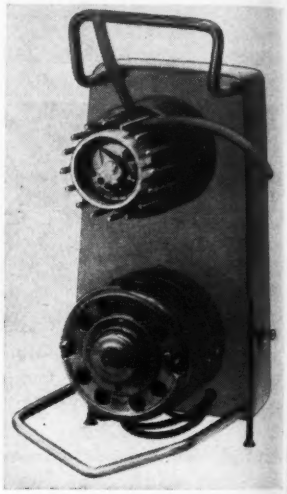
When inquiring check 5722 opposite last page

Pumps continuous flow through flexible tube to 0.1 cc per day

Corrosion-resistant feeder cannot contaminate

Uses: For pumping measured rate of flow.

Features: Unit provides continuous flow as low as 0.1 cc per day. Much higher flow rates can be obtained when desired. Metering feeder cannot contaminate fluid. Since liquids flow through flexible tube only, moving parts of pump are not exposed to corrosive elements.



Pump meters continuous flow of liquid through flexible tube as low as 0.1 cc per day

Description: Device can meter equal flows in two or more completely isolated systems if same size tube is used. If tube wall thickness is maintained, two or more liquids can be metered to same or different systems at rates proportional to diameter of different tubes. Commercial gum rubber, neoprene, or tygon tube of proper size and good resiliency are recommended. Models with capacities up to 400 gph are available. Other models with capacities up to 2000 gph are expected to be available soon, according to manufacturer.

(Kinetic-Clamp is product of Corneil Associates, Dept. CP, R.R. 1, Thorold, Ontario, Canada . . . or check 5723 opposite last page.)

Combination of inhibitors provides much better corrosion control

Superior to individual use for cooling tower systems

Uses: For control of corrosion in cooling tower systems.

Features: Combination of inhibitors is said to provide much better corrosion control than any of several inhibitors used alone. Formula is effective over relatively wide range of pH conditions, thus control of pH of cooling water is easier and much less exacting than required with many corrosion control treatments.

Description: Water treatment formula is basically chromate type material to which other inhibitors, each of which exerts a synergistic effect on the others, have been added. It is produced in form of three-inch diameter briquettes, weighing approximately one lb each.

Simple by-pass feeder is normally used to apply inhibitor. Cooling water passing through feeder dissolves ball briquettes and carries solution of chemical treatment back into cooling water line. In some cases, briquettes are merely dissolved in wire basket suspended in tower basin.

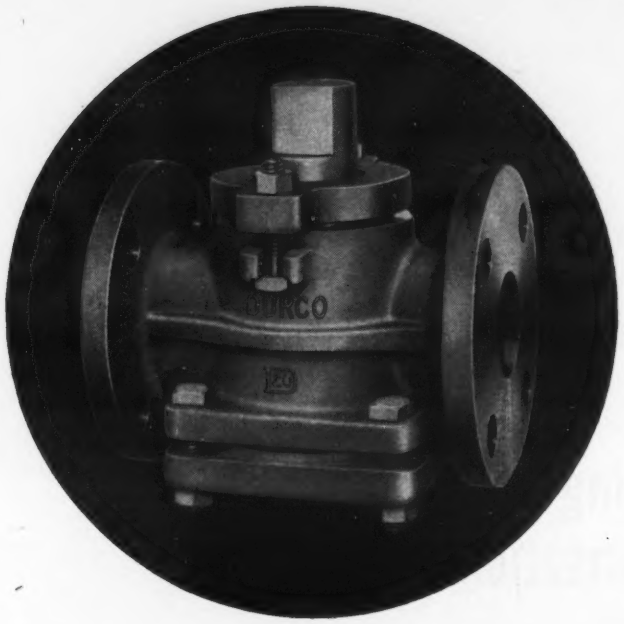
(Nalco 360 is product of National Aluminate Corp., Dept. CP, 6216 W. 66th Place, Chicago 38, Ill. . . . or check 5724 opposite last page.)

FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service Slip opposite last page of this issue. Fill in Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.



Positions wanted, corrosive

The tougher the better!

The DURCO TYPE F VALVE with Teflon sleeve offers an unusually wide range of "experience" in chemical service—from fuming nitric acid and all concentrations of sulfuric acid to the mild salts and alkalies. Service conditions range from elevated temperatures in steam traced lines to below freezing applications. Service record: excellent!

How about these qualifications for your application? (1) Non-sticking; (2) No metal-to-metal contact; (3) Needs no lubrication; (4) Requires no packing; (5) Renewable sleeve and plug.

Full technical data quickly available through your DURCO representative, or write for Bulletin V/4a

DURCO TYPE F VALVE

Sizes ¼" through 2", in Durimet 20, Chlorimet 2, Chlorimet 3, Monel, Nickel, and other alloys.

DURCO CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON COMPANY, INC., DAYTON, OHIO

Branch offices: Atlanta, Boston, Buffalo, Chicago, Cleveland, Detroit, Houston, Knoxville, Los Angeles, New York, Philadelphia, Pittsburgh

When inquiring check 5725 opposite last page

Plastic Coating Stops Costly Condensation Drip and Rust

THE COSTLY PROBLEM caused by dripping from this sweating pipe was permanently solved with one easy and inexpensive application of NoDrip Plastic Coating. Sweating pipes, ceilings, air ducts and other metal equipment are also completely protected against rust and corrosion by low cost NoDrip.

NoDrip Plastic Coating acts immediately to insulate and protect. One application adds many years of service life to metal equipment. NoDrip is also resistant to acid, alkali and brine...protects concrete, brick, plaster, tile wood or composition surfaces.

Easy application requires no special equipment or skill. Anyone can apply NoDrip with brush, trowel or spray. Stop your condensation problem now! Get full details without delay.

JW Mortell COMPANY

FREE

32-PAGE NoDrip DATA HANDBOOK
Complete with photographs, charts and technical information to solve your condensation problem. Write today.
Available at leading plumbing and mill supply houses

J. W. MORTELL CO. 530 Burch St., Kankakee, Ill.
Please send my FREE copy of the NoDrip Data Handbook.

Name_____

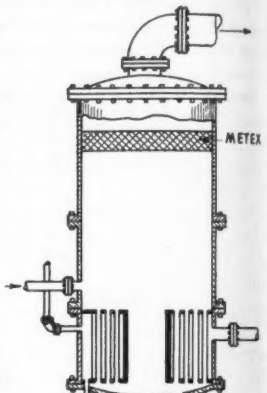
Company_____ Title_____

City_____ Zone____ State_____

When inquiring check 5726 opposite last page

(Left) 30"-diameter vapor line from evaporator at Frontier Chemical Co., indicated here by H. V. Coats, Jr. Production Superintendent, was being destroyed by entrained caustic until installation of wire mesh mist eliminator

(Below) Schematic of installation of mist eliminator in an evaporator. Periodic water-spray backwash keeps wire free of solid particles



Entrained liquid in vapor stream from NaOH evaporator at Frontier Chemical Co., was destroying large steel vapor line. Here's how company avoided costly line replacement and halted product loss.

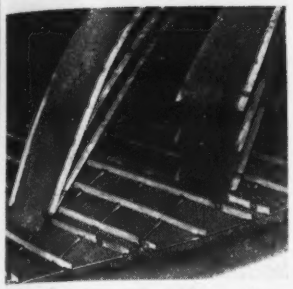
Knitted wire mesh knocks out caustic mist

THEODORE W. WETT, Assistant Editor
With **H. V. COATS, JR.,** Production Superintendent
Frontier Chemical Company
Div. of Union Chemical & Materials Corp.
Wichita, Kansas

Problem: Caustic carryover was causing embrittlement cracking failure of steel vapor lines and contaminating cooling water in barometric condenser serving caustic evaporator at Frontier Chemical Co. Water was recycled and had to be neutralized to prevent deterioration of cooling tower. Estimated cost of neutralization and product loss was $8 a day.

A more pressing consideration was the growing necessity of replacing a large quantity of 30"-diameter vapor line being rapidly deteriorated by caustic mist. Replacing the line with stainless steel pipe would end corrosion but only at considerable expense. Neutralization of cooling water would still be necessary and product loss would continue.

Evaporator is used to concentrate caustic from 12 to 50% and processes approxi-



Mist eliminator with grids in place, strips are easily passed through manways and assembled within vessel

mately 50 tons/day of NaOH. Unit is a tube-shell, forced-circulation, single-effect vertical evaporator, 30 ft high and 8½ ft in diameter. It operates under a vacuum of 25 inches of Hg.

Solution: In late 1953 Frontier installed a knitted wire mesh mist eliminator in caustic evaporator. Device is placed across upper portion of evaporator shell four ft from vapor outlet. Other than installation of a supporting grid, no additional vessel changes were necessary.

Mist eliminator is essentially an 6-inch pad of uniform density made of layers of knitted nickel wire. Each layer is crimped diagonally and direction of crimp is alternated in successive layers. This results in a structure having a maze of unaligned, asymmetrical openings, an unusually high free volume (97 to 98%), and an impingement target area approximately 100 sq ft per cu ft.

As vapor passes through mesh, entrained liquid droplets impinge upon extensive wire surface area . . . and are removed from vapor stream. Droplets coalesce and flow down through mesh to form large drops which break from under-side of mesh and fall back to surface of liquid. A 30 minute water-spray backwash, twice a week, keeps pad free of solid particles.

Results: Product loss and the need for neutralization have been eliminated. More important, with a few minor repairs, original steel vapor line has continued in use

Turn to page 180

Glascote's acid-alkali glass
— 100% corrosion resistant with zero contamination
Glascote's non-stick glass
can't clog . . . polymers flow free

double-barreled protection
for highly corrosive processing and polymer production

Glascote glass-lined pipe and fittings

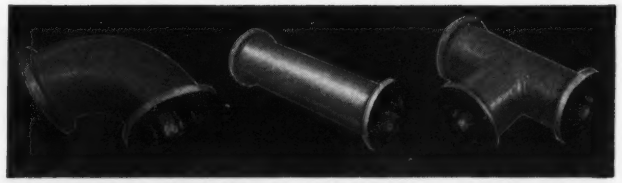
GLASCOTE has now improved delivery of glass-lined pipe and fittings almost 50%. In fact, GLASCOTE now manufactures and stocks pipe and fittings to ASME standards for fast delivery to help you with your replacement problems in scores of applications.

Pipe is fabricated and stocked in standard lengths up to 10 ft. and inside diameters from 1½" to 4". Larger diameters are made to order.

Standard fittings in 1½" to 4" diameters are stocked. Larger sizes and special pieces are built to order.

Leak-proof gaskets, available to suit materials conveyed, can be installed without special tools.

Our standard one-year guarantee continues to apply to all Glascote glass-lined products.



Glascote®
PRODUCTS, INC.
CLEVELAND 17, OHIO
Sales Offices or agents located in
New York • Philadelphia • Union, N. J. • Chicago • Cleveland
Dayton • Houston • Los Angeles
Export Sales: A. O. Smith Corp., International Division, Milwaukee 1, Wis.

Ask the representative who calls on you for all the facts about Glascote products — reactors, receivers, condensers, evaporators, storage tanks and accessory products. Or, if you prefer, write direct. Glascote Products, Inc., Cleveland 17, a subsidiary of A. O. Smith Corporation.

A subsidiary of A.O.Smith Corporation
World's largest manufacturer of glass-lined steel products

Permaglas water heaters
Glass-lined beer storage tanks
Glass-lined bulk storage units
Glass-lined aircraft electrical equipment
Glass-protected (inside and out) smoke stacks

When inquiring check 5727 opposite last page

2,000,000-gallon ammonium nitrate ta

Notice expansion joints around edge of tank, which looks like a small football stadium. Workmen are getting ready to weld.

Hercul
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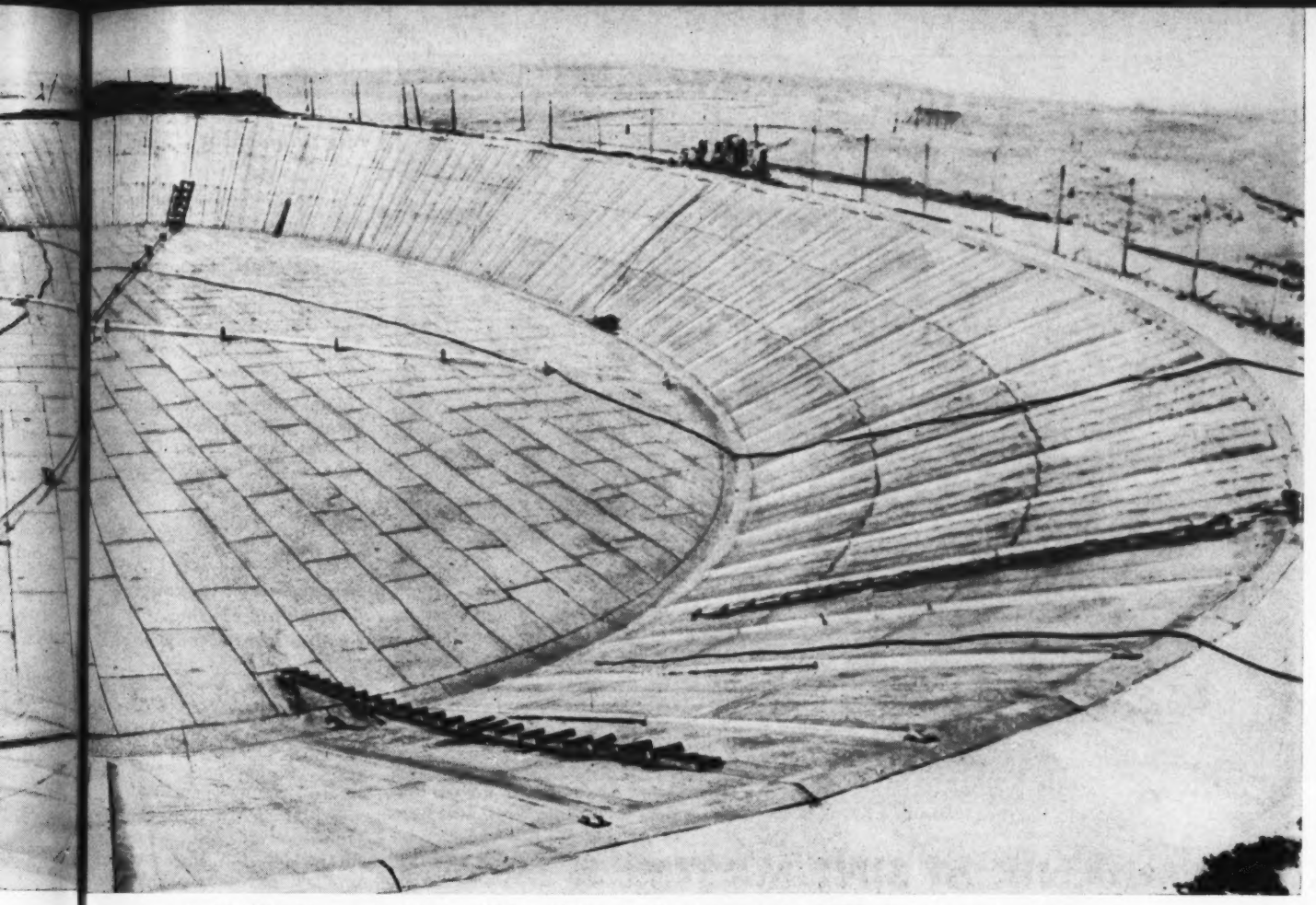
UNI
NATIONAL



Tank is 200 feet in diameter at the top, 150 feet at bottom. It's 15 feet deep, holds 2,000,000 gallons of ammonium nitrate.

tank lined with USS Stainless Steel

Hercules Powder Company needed an ammonium nitrate storage tank, so they used a two-million-gallon concrete reservoir that had been unused since World War I. The tank is located near the city of Richmond, California.

The tank was cleaned and lined with 124,000 pounds of 14-gage USS Stainless Steel, Type 304. Sixty rib-like expansion joints were pressed into the Stainless Steel, and the fabricated steel was welded at the job site by field crews of U. S. Steel's Consolidated Western Division.

Three and one-half miles of lap seams were welded, and every inch was vacuum-tested. And, in more than 18,000 feet of welds, only two tiny imperfections were discovered.

In chemical plants, the imaginative use of corrosion-resistant Stainless Steel can result in tremendous cost savings. To be sure of service-tested quality, make it *USS* Stainless Steel. It's in stock at your nearest warehouse.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

UNITED STATES STEEL

When inquiring check 5728 opposite last page

Mist Eliminator

Starts on page 176

without any further deterioration. There is no longer a need to replace it with more expensive materials of construction.

Company estimates that present installation cost was less than one-half what it would have been with other types of separators.

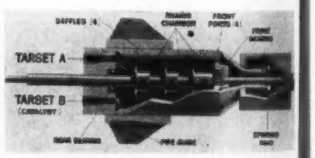
(Metex wire mesh mist eliminator is a product of Metal Textile Corp., Dept. CP, Roselle, N. J. Check 5730 on form opposite last page.)

Stops curtaining, sagging, in applying coating to pipe interior

Applicator blends components in few seconds

Uses: For applying coal tar-epoxy resin coating to pipe interiors.

Features: Tar-epoxy resin and catalyst, fed separately into applicator in controlled proportions, are blended in space of few seconds. Applicator centrifugally casts material on interior surfaces of pipe, eliminating curtaining or sagging that occurs when heavy film is applied in one coat.



High speed mixer blades of coating applicator thoroughly blend components in space of few seconds

Description: Coating applicator is capable of laying smooth film of coal tar-epoxy resin on interior of 20′ lengths of 3, 4, and 6″ pipe. Thickness of 15 to 20 mils was achieved in single pass.

(Coating applicator is product of Pittsburgh Coke & Chemical Co., Dept. CP, 2000 Grant Bldg., Pittsburgh 19, Pa. . . . or for more information check 5731 opposite last page.)

F. J. Tompkins, Chief Design Engineer (right), Bernard Anik, Mechanical Engineer (left rear), Singmaster & Breyer, N. Y. C. Foreground, Michael De Piano, Cooper Alloy Corp.

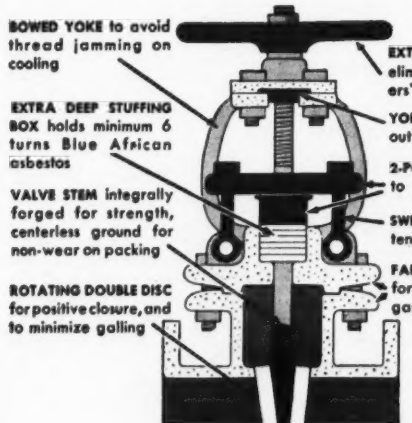
TOMPKINS and ANIK of SINGMASTER & BREYER

tell why they build Cooper Alloy stainless valves into their basic plant designs

Q. Gentlemen, precisely why do you buy Cooper Alloy valves?

FJT—With me, dependability is the main reason. My major concern is overall plant design, and frankly I don't have time to worry about every equipment detail. As specialists in designing and building "first-of-its-kind" processing plants, we need valves we can count on, and can "build in" as part of our original design. Cooper Alloy valves, we've found, fill that bill.

BA—From my point of view as a mechanical engineer, it's the Cooper Alloy valve *design* that appeals to *me*. It has extra features, like the extra-large handwheel, unique square compression of packing, bowed yoke, integrally forged stem, and others, all of which make for less maintenance and longer, more economical valve life.


BOWED YOKE to avoid thread jamming on cooling
EXTRA DEEP STUFFING BOX holds minimum 6 turns Blue African asbestos
VALVE STEM integrally forged for strength, centerless ground for non-wear on packing
ROTATING DOUBLE DISC for positive closure, and to minimize galling
EXTRA LARGE HANDWHEEL to eliminate need for "persuaders"
YOKE NUT REPLACEABLE without valve disassembly
2-PC. GLAND CONSTRUCTION to prevent scoring of stem
SWINGING EYEBOLTS for maintenance convenience
FAIRED BODY-BONNET FLANGES for equal stress and uniform gasket loading

A VALVE DESIGNED FOR STAINLESS!

The Cooper Alloy valve is not an adaptation of earlier brass and iron patterns. Cooper Alloy, with over 35 years of experience in handling stainless steel, created a valve *designed to be cast in stainless!* **Check the Special Design Features shown at left.**

As the little CA man below is saying: *"You can tell a Cooper Alloy Valve as far as you can see it!"* Write today for *your* copy of our folder "Design Factors In Stainless Steel Valves." The Cooper Alloy distributor near you will be glad to show you the complete line of Cooper Alloy valves *and fittings*, and their advantages. He can serve you promptly from local stocks.

COOPER ALLOY

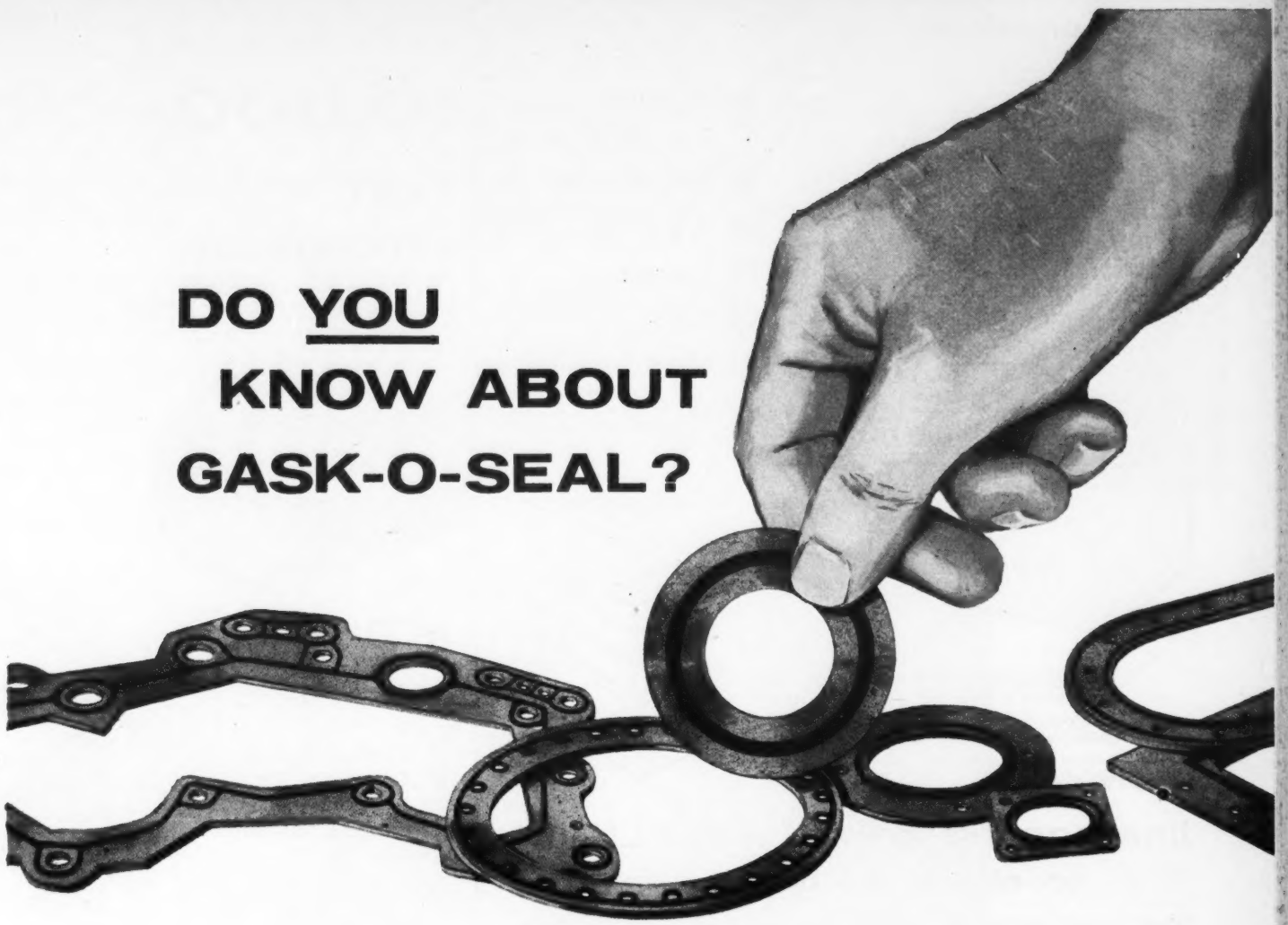
Corporation • Hillside, New Jersey

VALVE & FITTING DIVISION

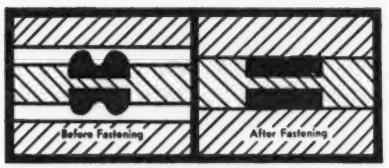
THIRTY-FIVE YEARS OF STAINLESS STEEL PIONEERING

When inquiring check 5729 opposite last page

DO YOU KNOW ABOUT GASK-O-SEAL?



The static seal that can not blow out!



The above diagram is "typical" only. Gask-O-Seals are also made with one-side seals.

If you do not know about Gask-O-Seals look at these facts:

- ✔ Gask-O-Seals will seal practically any processable fluid . . .
- ✔ Gask-O-Seals can be re-used . . .
- ✔ Gask-O-Seals will seal at low or high pressures, vacuum or positive . . .
- ✔ Gask-O-Seals are available as standards and as specials in almost any configuration or to meet special requirements.

They are recommended for flanges, gear boxes, transfer cases . . . *any* place where truly efficient static seals are needed.

Note: A recent development of the Gask-O-Seal principle indicates effective sealing in the temperature ranges of −400° to +1000° for specific applications.

"—the O-Seal family:
Lock-O-Seal®
Gask-O-Seal®
Stat-O-Seal®
Bolt-O-Seal®
Riv-O-Seal®
Banj-O-Seal®
Termin-O-Seal®

FRANKLIN C. WOLFE CO.
Culver City, California
"sealing design specialists"
A DIVISION OF Parker APPLIANCE COMPANY
Hydraulic and fluid system components

For more information on product at right, specify 5733 see information request blank opposite last page.

Spray type, forced draft counter flow, high temperature cooling and deaerating tower supplying high purity process water. Inside dimensions are 16' x 12' x 29'6". Lined with Kaykor Fligid by Wyatt's Plastics, Inc., Div. of Wyatt Metal & Boiler Works, Inc., Houston, Texas.

line cooling towers with FLIGID® to eliminate corrosion

While wood is the traditional material for cooling towers, corrosive process water—or chlorine compounds admixed during cooling—often make it a very expensive choice. Engineers faced with this problem at the Gulf Coast plant of a major processor solved it by taking a tip from the process vessels *in* the plant . . . and called for vinyl linings.

They learned that flexible linings like Kaykor L-10 could easily be applied, but wouldn't resist the calcium hypochlorite used to "bleach" the process water. And while rigid vinyl like Kaykor F-92 did resist the hypochlorite, it couldn't be efficiently applied to the tower walls.

As a result, the entire interior was lined with Kaykor Fligid . . . an amazing laminated lining material which has one L-10 face and one F-92 face. A standard Kaykor cement system makes it easy to apply the L-10 face to both the concrete foundation and the marine plywood lined redwood walls. And the exposed face of unplasticized F-92 provides the ultimate in lining strength and corrosion resistance.

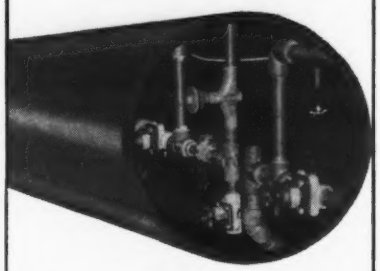
Chances are one or all of these materials can solve your corrosion problems, whether they involve cooling towers or any other kind of process equipment. A vast network of qualified applicators and fabricators across the U. S. and Canada give fast and experienced service in the field or in the shop. If you'd like further technical information, we'll be happy to provide you with our General Bulletin 1000 on request.

® KAYKOR INDUSTRIES, INC.
Division of Kaye-Tex Manufacturing Corp.
4401 Broad St. • Yardville, New Jersey

When inquiring check 5734 opposite last page

AT PATHECOLOR

10,000 FEET OF CORROSION RESISTANCE

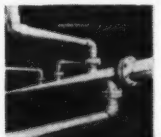


ALPHA PVC PIPE

10,000 Feet of Alpha PVC piping provide Pathecolor, Inc., with corrosion-proof photographic development system.

- *Resists 5% $K_3FE(CN)_6$ + dilute H_2SO_4; also 4% HBr.*
- *Won't contaminate solution.*
- *¼ cost of stainless.*
- *½ weight of aluminum.*
- *Joints made with hacksaw and cement only.*

If you convey corrosive or hazardous liquids, Alpha PVC can solve your piping problems too.



SEND FOR THE NEW 12-PAGE ALPHA CATALOG.

ALPHA PLASTICS INC.
OKNER PARKWAY, LIVINGSTON, N. J.

When inquiring check 5735 opposite last page

Teflon-lined steel pipe resists corrosion, heat, has no toxic effects

Coefficient of friction is e... tremely low

Uses: For handling sodium peroxide, hydrofluoric acid, high concentration phosphorous compounds, xylene, chlorine, concentrated sulfuric acid, aqua regia, and organic acids.

Features: Lining is impervious to attack of nearly all acids, chemicals, solvents, and caustics. It has no toxic effects and will not contaminate solutions it carries. Temperatures up to 400°F and pressures of

Teflon-lined steel pipe will solve toughest corrosion problems

300 psi can be withstood. Material has extremely low coefficient of friction.

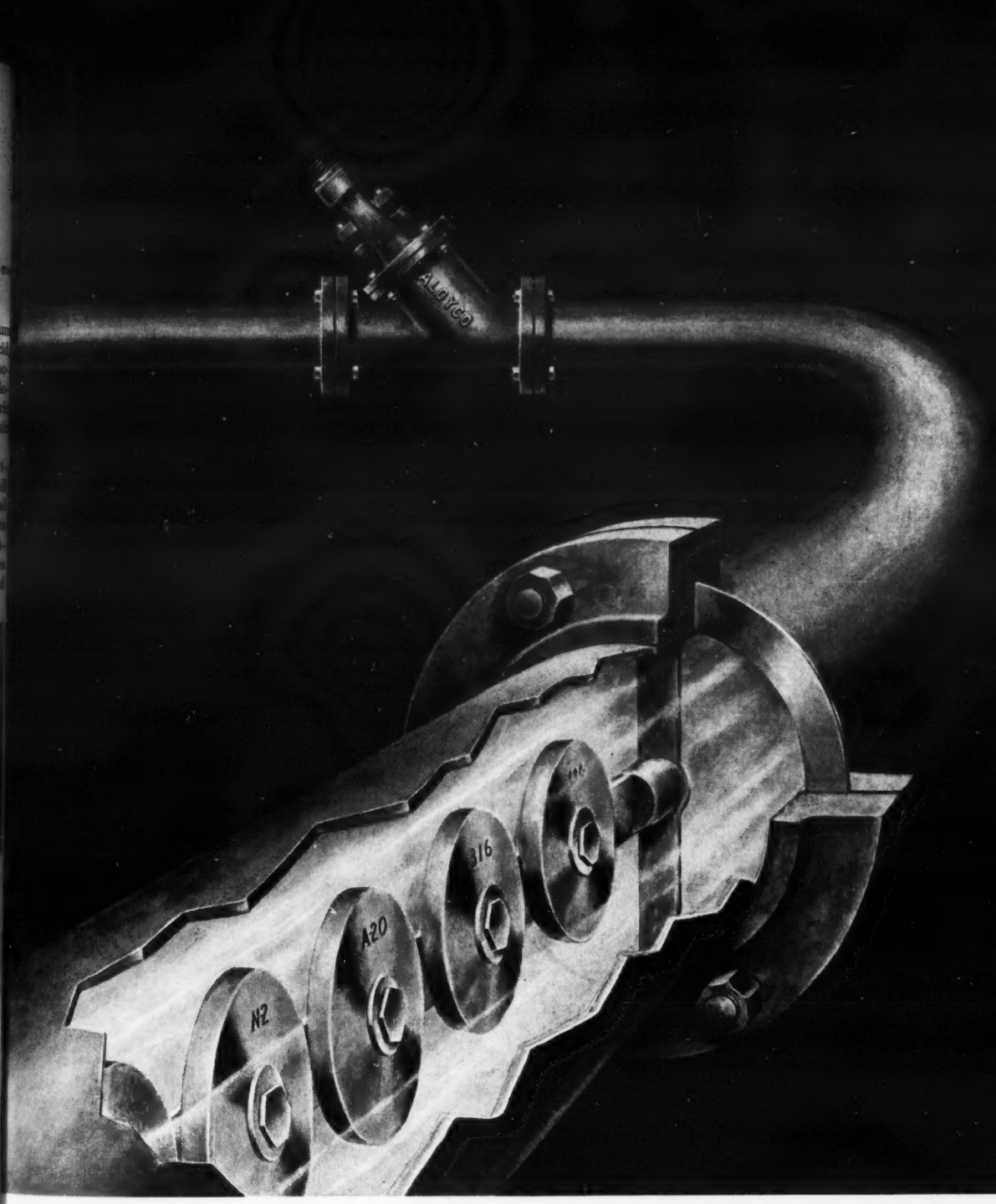
Description: Teflon-lined steel pipe is available in sizes of 1, 1½, and 2", in lengths of 2, 5, and 10'.

(Teflon-lined steel pipe is available from Haveg Industries, Inc., Dept. CP, 900 Greenbank Rd., Wilmington 8, Del. . . . or check 5736 on form opposite last page.)

Flexible tube data

Characteristics and installation advantages of flexible polyamide tube are described in 4-page bulletin. Bul BR-3A — The Polymer Corporation of Pennsylvania, Dept. CP, Reading, Pa. Check 5737.

For more information on product at right, specify 5738 . . . see information request blank opposite last page.



Inside look at Aloyco Corrosion Engineering Service

This is a realistic illustration of an Aloyco line test—as it might be conducted in your plant as a regular part of Aloyco Corrosion Engineering Service.

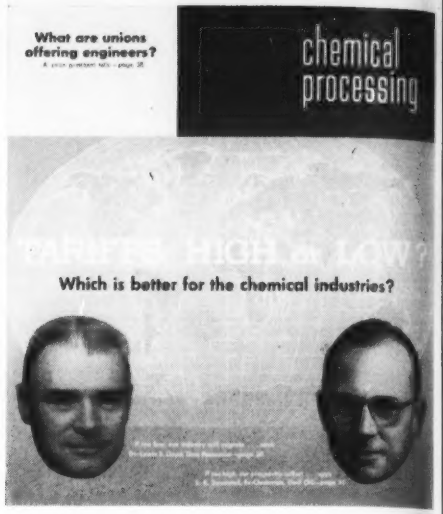
Whenever there is no 'book solution' to a specific valve problem, we will prepare a test rack carrying a series of alloy specimens (discs above) to be inserted in your process line. Purpose is to pinpoint the alloy that will most efficiently stand up to the specific corrosives under your actual line conditions.

Our sole purpose with the Aloyco Corrosion Engineering Service is to help you successfully solve corrosives-handling problems. Our resources are the metallurgical experience, foundry skills and engineering know-how we have gained in twenty-seven years as the world's largest specialist in Stainless Steel Valves.

Bring your corrosion problem to Alloy Steel Products Company, 1301 West Elizabeth Avenue, Linden, New Jersey. 7.2

ALLOY STEEL PRODUCTS COMPANY

Can you "pay for" a magazine like this? with a $3.00 or $5.00 subscription?



This magazine costs more than $40.00 per year

Maybe you've thought publishers make money on a $3.00 or a $5.00 subscription . . . and that is why they ask you to subscribe.

No, it's not true . . . your $3.00 or $5.00 fall far short of "paying" for *any* really good business magazine.

The costs of printing, paper and postage alone usually exceed subscription prices. Editorial costs and other expenses run to many times that amount. And usually it costs more just to sell such subscriptions than they bring the publisher in dollars. So, the publisher actually "loses money" on such sales.

Then, why? . . . yes, *why* do some publishers charge a nominal rate for a subscription . . . but other publishers send their magazines without charge?

Well, the "paid-subscription" magazine gets a lower postage rate than does the "non-paid subscription" magazine. Some publishers feel this postal advantage is important. So they charge a "token fee" as a subscription price. And so win a lower postage rate.

But—whether you pay nothing, or such a "token fee," you—the reader—do not *really pay* for the magazine's service.

No — advertisers pay the bills . . . and so, logically, advertisers *demand* the best possible coverage of the important, key men of the field. That means folks like you, who exercise buying power.

CHEMICAL PROCESSING "handpicks" its readers—for best, effective circulation . . . and sends the magazine to these key folks, without charge.

You see, you simply can't get maximum coverage of important folks by trying to force them to buy subscriptions. Such men, limited in numbers, are scattered all over the U.S.A.; travel and/or direct mail cost money; a large share "forget to renew" each year; and, no matter how much time, money and pressure you put on them, there are always some important men who will never buy.

You don't "pay"—still CHEMICAL PROCESSING gets better circulation. So, as you can see, a subscription price is at best but a "token payment." You don't really pay for any magazine with $3.00 or $5.00.

But, CHEMICAL PROCESSING gets the best, most effective circulation coverage by "hand-picking" the right readers. This gives values to advertisers which they can't possibly get in any other way.

That's why . . . CHEMICAL PROCESSING handpicks only qualified readers . . . The Management Team in chemical processing plants . . . presidents, partners, plant managers, foremen, engineers, chemists, directors of research, etc. Then the editors make the magazine so interesting, so valuable, these folks *want* to read it.*

That's why CHEMICAL PROCESSING spends many thousands of dollars on each issue — to give you this service costing more than $40.00 per year . . . without charge . . . as *you* are an important reader in the chemical field.

No, you can't "pay for" any good business magazine with $3.00 or $5.00. Whether you receive a "paid magazine" or a "non-paid magazine" you are still enjoying a valuable service — whose cost is far above any price you paid for a subscription.

**Every issue proves this qualified readership . . . by unequalled response from these key readers. May we show you the evidence?*

Chemical Processing

published by: Putman Publishing Company
also publishers of:
FOOD PROCESSING
INDUSTRY POWER
FOOD BUSINESS

"Executive Magazines for Industry"

there's nothing like

Vulcathene®

for resisting acids and corrosion!

VULCATHENE *is a tough, horn-like polyethylene . . . practically unbreakable! Lighter than aluminum . . .*

. . . easily put together with threaded couplings or socket welds (polyfusion).*

*patent applied for

CORROSION
VULCATHENE definitely *does not corrode.* All surfaces remain smooth under extreme corrosive conditions.

CHEMICAL RESISTANCE
VULCATHENE *resists* all alkalies and most strong *acids.*

SOLVENT RESISTANCE
VULCATHENE is almost completely *insoluble* in all organic solvents at room temperatures.

WATER RESISTANCE
VULCATHENE has *resilient elasticity* that responds to freezing water and returns to original thickness.

We invite your request for more detailed information about Vulcathene equipment and installations.

American Vulcathene
625 SOUTH GOODMAN ST. ROCHESTER 2, NEW YORK
A DIVISION OF THE NAILOR CO. INC.

When inquiring check 5739 opposite last page

Steel furnace refractory resists severe corrosion at high temperatures

Material has high load bearing strength at high temperatures

Uses: For high-temperature refractory applications.

Features: Corrosion resistance and load bearing strength are extremely high at elevated temperatures. Melting temperature is above 4300°F.

Description: Material is magnesite-chrome basic refractory manufactured by electrically melting raw materials at 4300°F. Molten refractory is poured into molds of various sizes and shapes. Characteristic structure of refractory makes it more impermeable to gases and slags than conventional refractories. It is strong enough to support its own weight in a sprung arch roof.

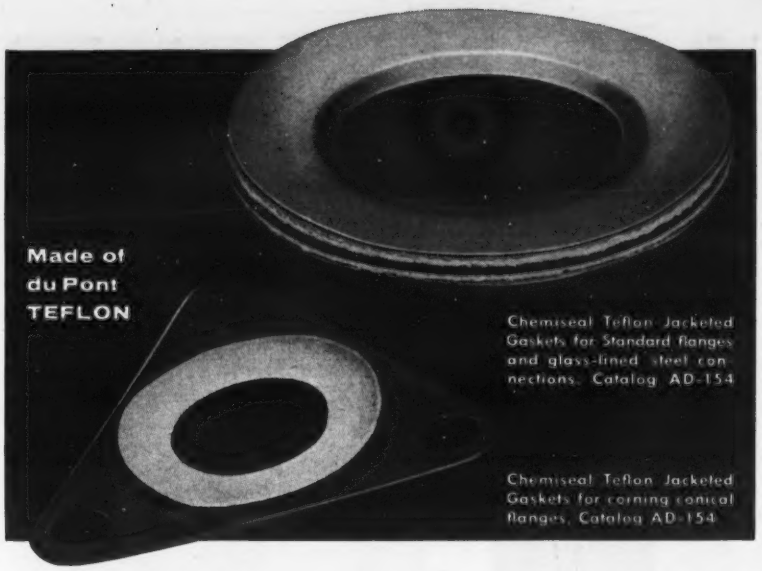
(Corhart 104 Electrocast Refractory is product of Corhart Refractories Co., Subs. Corning Glass Works, Dept. CP, 1600 W. Lee St., Louisville 10, Ky. . . . or for more information check 5740 on form opposite last page.)

Operate PVC check valve 38,000 times per day with no sign of wear

Line carries 10-15% sulfuric acid solution

Problem: An economical check valve that would give maintenance-free service under corrosive conditions was needed at refrigerated extraction plant of Tennessee Gas Transmission Co. at Greensburg, Ky. Line carrying 10-15% sulfuric acid solution, which bore traces of sand in suspension, served 72-stroke per minute pump. Discharge head was 6′ and suction lift 8 to 20″. Operating temperatures were within range of 50-75°F.

Solution: A 1″ PVC lift check valve was installed in sulfuric acid line. Valve incorporates principle of PVC pipe union. This arrangement


Made of du Pont TEFLON
Chemiseal Teflon Jacketed Gaskets for Standard flanges and glass-lined steel connections. Catalog AD-154
Chemiseal Teflon Jacketed Gaskets for corning conical flanges. Catalog AD-154

Chemiseal Gaskets

AND ACCESSORIES FOR CHEMICAL PIPING

IMPERVIOUS TO — **ACIDS**
— **CAUSTICS**
— **SOLVENTS**

Chemiseal Teflon Expansion Joints and Flexible Couplings. Good insurance against chemical piping casualties. Eliminate gaskets, adaptors, slip-joints; connect unlike piping ends and nozzles. Catalog AD-137

Here are Gaskets, Expansion Joints, Flexible Couplings, Adaptors, and Reducers, that will seal against any chemical your process equipment and piping can handle.

They are made specifically to suit every connection problem —every pipe and nozzle material requirement, whether glass, ceramics, stainless, Karbate, Haveg, glass-lined steel, etc.

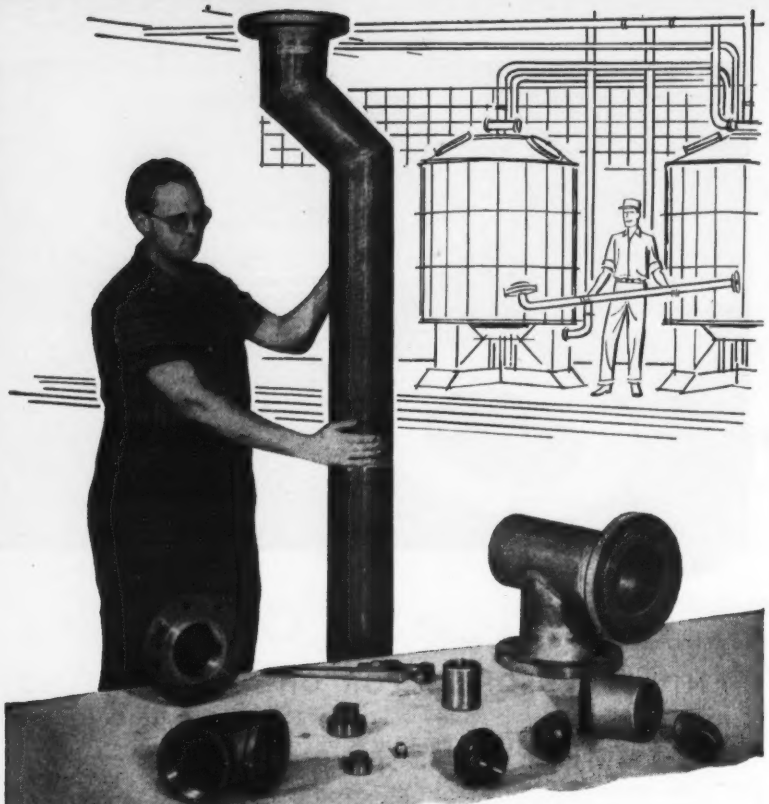
They are designed to protect these costly materials against installation and operating hazards by providing minimum bolt loading, by accommodating thermal expansion, contraction, and misalignment and by absorbing shock and vibration.

Write for further information.

UNITED STATES GASKET CO.
Camden 1, New Jersey

United States Gasket Plastics Division
OF THE GARLOCK PACKING COMPANY

When inquiring check 5741 opposite last page



AMPCO PIPE and FITTINGS

resist corrosive action of fatty acid hydrolysis

Ampco Pipe and Fittings resist corrosion, erosion, and cavitation-pitting of a wide range of alkalies and acids

Brinell hardness of 150 — tensiles up to 70,000 psi

High velocity tolerance — flow rates of 18-20 fps

Thread not distorted by wrenches or hammers — no leakage

Ampco Pipe and Fittings are made from a unique aluminum-bronze alloy that takes the trouble out of handling troublesome, corrosive media.

Look at how soapmakers use Ampco Pipe and Fittings, for example. In making soap, a solution of sulphuric acid is added to fatty acids. One company uses Ampco Pipe to transfer this solution from wooden tanks. Another uses Ampco Pipe and Valves — and, in addition, uses tank liners made of Ampco Metal.

You can get Ampco Pipe in all standard sizes, many from stock. Fittings are available to 3000 pounds; flanges, to 5000 pounds.

Write us concerning *your* problem.

AMPCO METAL, INC.

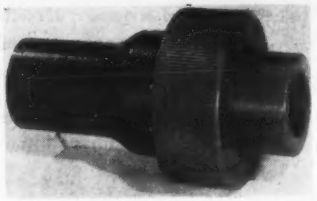
Dept. CP-9, Milwaukee 46, Wis. • West Coast Plant: Burbank, Calif.

AMPCO®

THE METAL WITHOUT AN EQUAL

PR-25

When inquiring check 5742 opposite last page



Only moving part of PVC check valve is self-energizing disc

permits easy, quick removal from line for cleaning and servicing when required. Valve's only moving part is self-energizing disc.

Results: PVC valve has opened and closed on average of 38,000 times per day for over six months without any sign of wear. Simple, durable, and efficient valve has satisfactorily replaced metal valves that created corrosion and maintenance problems or were too expensive for economical use.

(PVC lift check valve is product of Tube Turns Plastics, Inc., Dept. CP, 2929 Magazine St., Louisville 11, Ky. . . . or for more information reader may simply check 5743 on form which is located opposite last page.)

Valves with Teflon sleeve last 36 times as long as former valves

Handle liquid at 270°F and pH of 2.5

Problem: At Diamond Alkali Company, Kearny, N. J., only 20 to 30 days service was obtained from ⅜" valves used for handling Tanolin, a compound used in the tanning industry. Valves were being used on a spray header which handles the Diamond chemical at a temperature of about 270°F and a pH of 2.5.

Solution: In June 1954 plant installed Type F valves which utilize a Teflon sleeve. This valve consists essentially of a corrosion-resistant alloy body and plug separated by the Teflon sleeve. Tapered plug with adjusting plunger and screw provide positive sealing pressures. All internal parts are renewable and can be easily replaced.

Results: First Type F valves installed on Tanolin spray header are still going strong after three years' service. Plant has saved the labor that was necessary for continually replacing the valves that failed. No longer is it necessary to continuously purchase replacement valves for this service.

According to A. M. Waller of the Diamond Alkali plant at Kearny, the plant first started to use the valves with Teflon sleeves on 66° Bé sulfuric acid in early 1952. Those valves are still in service. Sleeves have been replaced on only two of them.

Chief reason for trying the valves on sulfuric was from a safety angle. Old-time valve had a tendency to stick. Also, there was always the danger of breaking the small valves formerly used when opening or closing them.

(For further information on Type F valves with Teflon sleeves check 5744 on form opposite last page.)

Formulated with PVC, coating withstands corrosion

Non-absorptive material resists staining

Uses: Protective finish for concrete, brick, stucco, plaster, fabric, and previously painted surfaces, indoors or outdoors.

Features: Formulated with PVC, coating withstands chemical attack and effectively seals plaster and masonry against water vapor penetration. It is non-absorptive and resists staining.

Description: Coating is odorless, tasteless, non-toxic, nonflammable, non-porous, and unharmed by repeated scrubbing with detergents. It will not support combustion or conduct electricity. Coating air dries in 2 to 4 hours. It is available in 12 colors.

(No. 88 coating is product of Amercoat Corporation, Dept. CP, 4809 Firestone Blvd., South Gate, Calif. Check 5745 opposite last page.)

FERROLITE
REG U.S. PAT OFF

HEAVY DUTY ACID-PROOF FLOORS

FERROLITE is a very hard, yet resilient, acid and waterproof, jointless type of floor finish. FERROLITE can be installed over any type of solid base such as wood, concrete or brick and will withstand concentrated floor loads of over 600 lbs. per square inch without indentation. FERROLITE COLORS are Red, Brown, Gray and Black.

ADVANTAGES —

FERROLITE Finishes are jointless, very homogeneous, easily kept clean, harden like stone and can be put into service 4 hours after installation. FERROLITE is elastic, resilient under foot, AND — it's ACID-PROOF. Also oil and grease proof FERROLITE is available.

APPLICATIONS —

Both the acid-proof and standard FERROLITE Floor Finishes are especially suited for chemical plants, plating rooms, acid processing plants, food plants, paint and varnish plants, in fact wherever chemicals or acids or a combination of both create a flooring problem.

INSTALLATION —

FERROLITE is installed in varying thicknesses of 1" up from thermo-regulated mobile power units especially designed in Europe and now available through Fulton in this country. All Fulton installations are made with our trained floor crews under our supervision which guarantees both quality of workmanship and uniformity of the finished product.

Write, wire or phone today to

FULTON ASPHALT COMPANY

Specialists since 1870 in quality floors

168 W. WACKER DR., CHICAGO 1, ILL.

PHONE: RA ndolph 6-1760

When inquiring check 5746 opposite last page

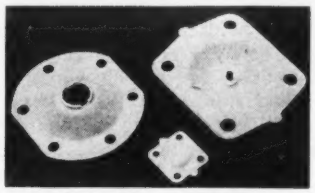
Diaphragm shields resist corrosion and heat

Not affected by alkalies in any concentration

Uses: For protecting diaphragm valves against corrosion and heat.

Features: Units are unaffected by all chemicals normally found in industry. They are not affected by alkalies in any concentration, nor will they swell or change weight when boiled in solvents or acids.

Description: Teflon and Kel-F diaphragm shields are available in seven sizes to fit diaphragm valves in three-inch-and-under size range. They are installed over rubber diaphragm. Temperatures of 350°F and higher are possible where low line pressures exist, i.e., approximately 30 psi.



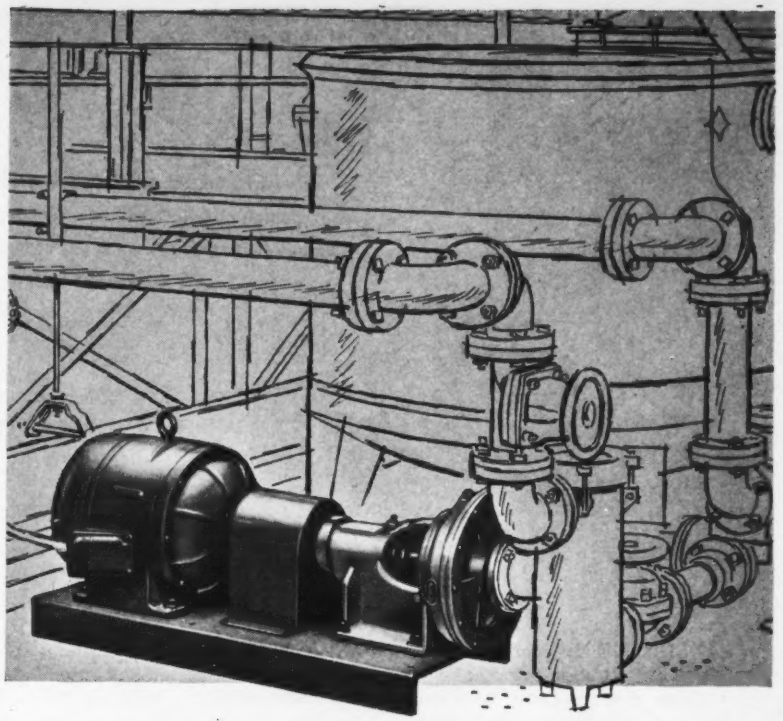
Teflon diaphragm shields for diaphragm valves provide corrosion and heat resistance

(Teflon and Kel-F diaphragm shields are available from United States Gasket Company, Plastics Div. of the Garlock Packing Co., Dept. CP, Camden 1, N. J. . . . or for more information check 5747 on form which is located opposite last page.)

Stainless steel selection

Booklet of 32 pages on stainless steel sheet and strip contains sections on proper selection of stainless steel grades and an index of applications in chemical and other industries. More than 20 tables are listed.

Bul SS38 — Allegheny Ludlum Steel Corp., Dept. CP, Oliver Bldg., Pittsburgh 22, Pa. Check 5748.



Corrosion Can't K. O. This Centrifugal Pump!

More than 108 different combinations

Speeds, 1750 to 3500 rpm.

Capacities to 600 gpm.

Heads to 300 feet

It's an AMPCO — and it's engineered to combat velocity erosion and corrosion

Impellers and fittings are made from aluminum bronze or other workable alloys that resist the action of corrosive, abrasive media — instead of from commercial, tin-lead bronzes.

Impellers and volute shapes are designed to reduce internal turbulence and liquid-metal boundary velocities.

When process conditions change, you can alter your Ampco Pump to satisfy new requirements, easily and inexpensively. Ampco application engineers can suggest more than 108 pump combinations possible by interchanging stock components. A distributor near you has Ampco Centrifugal Pumps *in stock* — at no premium price. Write us for his name.

AMPCO METAL, INC.

Dept. CP-9, Milwaukee, Wis. • West Coast Plant: Burbank, Calif.

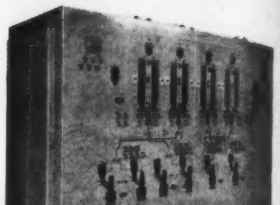
AMPCO ®

THE METAL WITHOUT AN EQUAL

AMPCO — ONE-SOURCE SERVICE FROM RAW MATERIAL TO FINISHED PRODUCT

PR-25

When inquiring check 5749 opposite last page

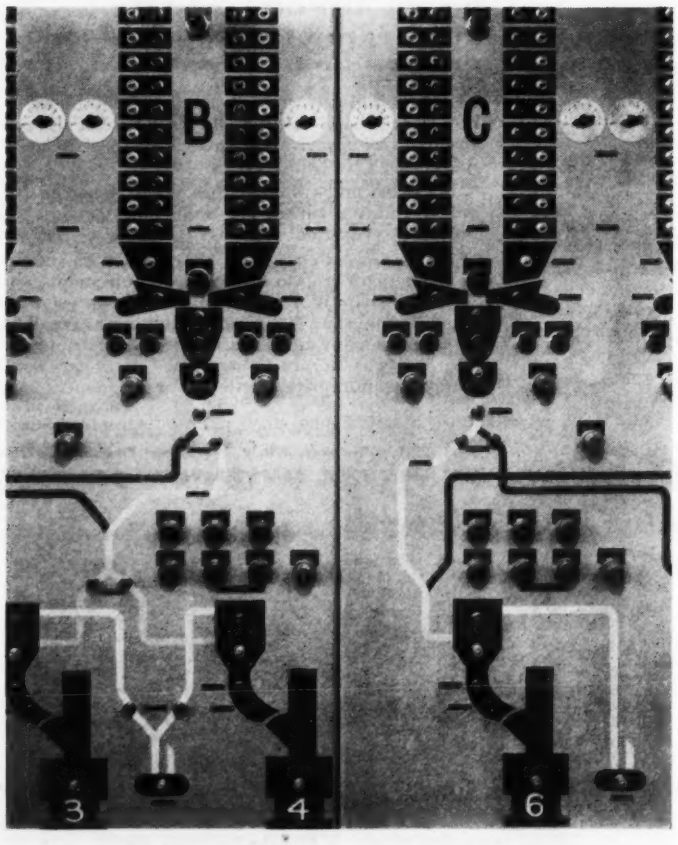


These two control panels will automatically control routing and proportioning of rubber pellets at Goodyear Tire & Rubber Co. of Kansas. Unique feature of system is use of vertical stack bins in conjunction with the control system to assure . . .

automatic 'no-stick' proportioning of rubber pellets

SOMETIME this fall, Goodyear Tire & Rubber Company of Topeka, Kansas, will be installing an automatic proportioning system in rubber manufacturing operations. System permits "dialing" of individual ingredient weights to proportion rubber pellets into blending operation.

System will control flow of material through pelletizing operation and cooling conveyor into any one of eight stack bins. Flow of pellets will be routed through stack bins, automatically proportioned by means of batch weighing, and discharged into an air-conveying network.



Enlargement of graphic panel section shows vertical stack bin arrangement and routing through scale to Banbury mixers

Pellets will then go to one of six Banbury receiving hoppers. When operator desires a batch for the Banbury mixer, he simply will press a button and a batch of pellets will be automatically discharged into mixer.

Operation will be controlled from panels in a control room. Graphic flow panel is 10′ long, 4′ wide, and 7′4″ high. On it, location of material and equipment in operation will be indicated by colored lights.

Control panel measures 8′ x 4′ x 7′4″. From this panel all weighings will be accurately controlled and circular-chart recorders indicate each weighing. End sections of both panels are removable for future addition of panel sections.

Unique bin arrangement for storing and handling rubber pellets is designed to prevent pellets from sticking together in storage. One complete stack consists of a vertical series of 10 individual bins, one on top of each other and each holding 2000 lb of pellets. Pellets are transferred from bin to bin by pneumatic discharge slide gates which form the bottoms of individual bins. Consequently, comparatively small masses of pellets are kept "on the move" while in storage, having no opportunity to pack together. There will be a total of 80 bins, arranged in four double stacks over four automatic scales.

Pellets from pelletizing operation are fed from feeder above top bin in the stack. When this bin is full, the pellets exert pressure against a diaphragm flow-control switch, except top bin which has a driven paddle level indicator. If bin below is empty, another switch actuates gate to discharge pellets by gravity to bin below.

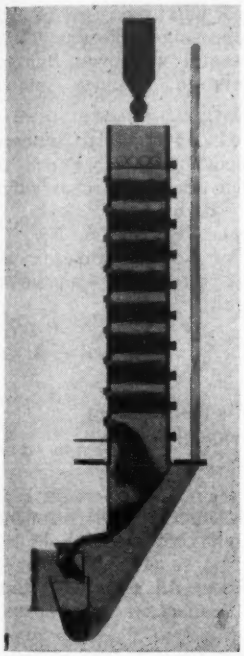
After a predetermined time interval to assure complete discharge, gate closes and bin is ready for another load. Same transfer sequence is followed through succeeding bins, until pellets reach the bottom bin in the stack.

Control mechanisms are interlocked to prevent gates for two bins in sequence from opening simultaneously. However, bins at several points (not succeeding) along the stack can be operated at same time. When all ten bins in a stack are loaded to capacity, a switch cuts off feed conveyor until top bin is ready to receive another load. Or, operator can stop conveying material to this particular stack at any time by selecting in another stack.

Operator has full automatic and full manual control on each bin. With a tap switch he can hold up discharge from any particular bin. Bins above and below that particular bin will continue their automatic transferring operation. Controls for bin operation are housed in graphic

panel section.

Below each set of dual stack bins is a fully automatic weighing scale. Pellets from each bottom bin are fed accumulatively from bottom hopper into scale through vibrating feeder. For accuracy in weighing at high speeds, each feeder is a dual speed



Stack bin design keeps comparatively small masses of rubber pellets in motion while in storage. There are 10 bins to a stack each separated by discharge slide gate. Material is transferred from one bin to another and to bottom hopper, where it is fed through vibrating feeder to automatic scale

unit. Preset amount is fed into scale at full flow rate, while remainder is under a dribble flow rate. Rate of feed as well as amount of dribble is externally adjusted.

Each weighing is marked on a circular-chart recorder mounted on control panel. Feeder cut-off points are dialed on a vernier weight selector. Weighings are electronically controlled. Each scale is equipped with a batch-stop counter so that a preset number of batches can

Turn to next page

Storage bins into which sand ingredients are conveyed by a Fuller-Kinyon Conveying System. Note the pipe-line system which permits ingredients to be conveyed into their respective bins.

One of two Fuller-Kinyon Pumps which convey sand ingredients to storage bins and from bins to mixers.

FULLER-KINYON CONVEYING SYSTEM HANDLES THREE DIFFERENT MATERIALS EFFICIENTLY, WITHOUT WASTE

To reduce costs and speed up handling of foundry sand ingredients with minimum waste, General Steel Castings Corporation, Granite City, Illinois, installed a Fuller-Kinyon Conveying System.

Here's what it does for them—

The system unloads corn flour, silica flour and bentonite from hopper bottom cars by means of Fuller-Kinyon Pumps which convey these materials through pipe lines to a number of storage bins. The flexibility of the system makes it possible to unload cars in a fraction of the time that would be required manually, *and*, waste due to spillage is eliminated. Two pumps used in the operation can be moved on narrow gage tracks for spotting under cars or bins. One pump is used mainly for unloading and delivery to storage—the other for delivery from storage to supply bins above the mixers. However, it is possible to unload cars and reclaim from storage simultaneously. Where bins are located so that they cannot discharge directly to a pump, an F-H Airslide® conveys from bins to the pump.

Prior to the Fuller installation, material was received in bags and manually unloaded, stored and transported to the mixers. It figures—*costs were much higher*. Now, waste has been eliminated! Another important feature—the company has realized extra savings by purchasing materials in bulk.

Fuller air-conveying systems are in operation in hundreds of plants throughout industry, cutting costs and increasing profits, day in and day out. The next time you have a materials-handling problem, why not get in touch with Fuller . . . chances are you will also profit.

Fuller . . . . pioneers in harnessing AIR

FULLER COMPANY P-168 4038

136 Bridge St., Catasauqua, Pa.

SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

When inquiring check 5750 opposite last page

How to pump "handle with care" liquids and semisolids

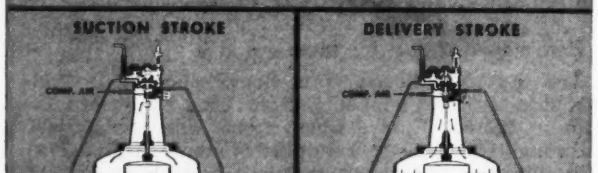
New, air-operated *Ejectopump* works with a powerful yet gentle action—does not churn, whirl or chop the material being pumped. Whole grapes or even live goldfish can be pumped without damage. "Handle with care" liquids such as latex can be pumped without shear or turbulence. Inflammables can be pumped with safety since there are no electrical connections to cause sparks. Ideally suited for pumping highly abrasive and viscous liquids.

Ejectopump needs practically no maintenance. Has no rotating or reciprocating parts, no bearings, no packing, needs no lubrication.

Operation

Connect to any compressed air line 30 to 50 psi. Handles discharge heads up to 100 ft., with maximum suction 20 ft. Discharge rate may be precisely regulated. Pump is self-priming, may be installed above level of liquid pumped. Can be furnished in special alloys for pumping corrosives. Sizes: 1½", 2", 3", 4", 6".

WRITE TODAY for complete information and prices



FERRO CORPORATION
Supplies Division
4150 East 56th Street, Cleveland 5, Ohio

Ejectopump
COMPRESSED AIR OPERATED

When inquiring check 5751 opposite last page

'No-Stick' Weighing

Starts on page 186

be delivered without an operator in attendance.

Except for a few monitoring lights on graphic panel, all controls for weighing of pellets are housed on control panel.

Pellets, discharged from scale into air-conveying system, will feed to receiving hopper above Banbury mixer. Operator will press button to discharge a batch into the mixer.

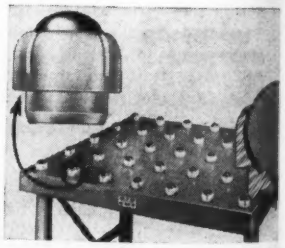
(Select-O-Weigh automatic proportioning system and stack bins are manufactured by Richardson Scale Co, Dept. CP, Clifton, N.J. . . . or for more information check 5752 on form opposite last page.)

Balls do not clog in this transfer unit

Design permits continuous self clearing of balls

Uses: As a transfer station in connection with conveyor lines.

Features: Design allows self clearing of balls and prevents their clogging. Cup is designed to support ball on friction-reducing protrusions that require no lubrication. Cup is slotted to permit ball to be snapped in or out without tools.



Right-hand diagram shows self clearing feature of ball transfer unit

Entire unit has been proved in tests to be impervious to steam cleaning, brine, detergents, mild acids, alkalies, oil, sand, and grit.

Description: Standard units are designed for pressure mounting in 3/16" H. R. steel plate. Cup diameter above base plate is 1-15/16". Height from plate to top of ball is 15/16". Standard unit is made with 1" chrome alloy steel ball, but can be furnished with balls of other materials.

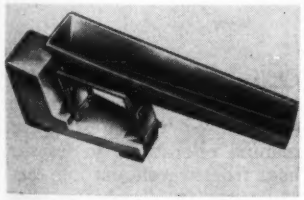
(Metzgar-NYLO ball transfer units are manufactured by Metzgar Conveyor Co., Dept. CP, 412 Douglas St. N.W., Grand Rapids, Mich. . . . or for more information check 5753 on form opposite last page.)

Trickle to 500 lb/hr is capacity of small vibrating feeder

Unit is compact, weighs only 10½ lb

Uses: Incorporation into weighing and packaging machines and other processing equipment for feeding up to 500 lb per hour bulk material.

Features: Feeder is compact unit, 6" high by 15" long. It weighs 10½ lb. Rate of feed can be regulated from trickle to full flow.



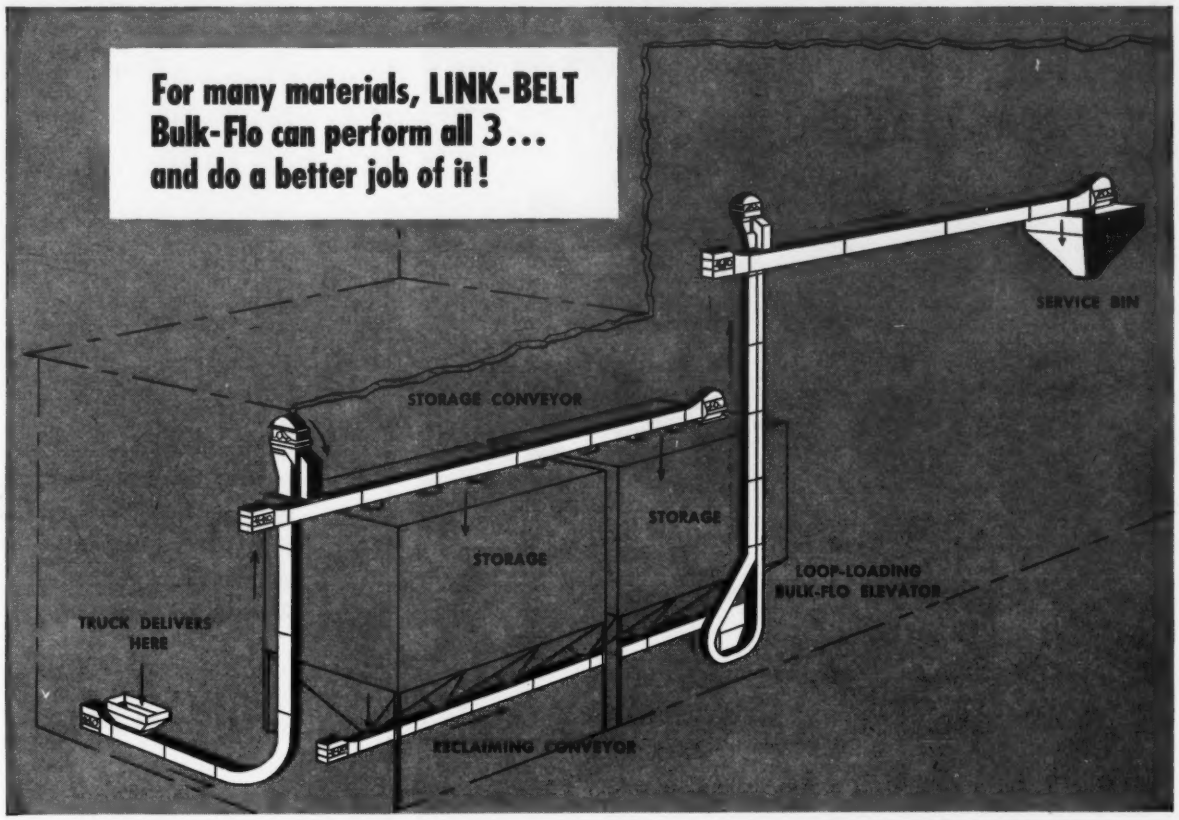
Vibrating feeder measures 6" high by 15" long and weighs 10½ lb

Description: Device utilizes electromagnetic vibrating principle — eliminating bearings, sprockets, chains, gears, belts and idlers.

Control of material flow rate is by a rheostat in separate controller. Feeder operates on 115v, 60 cys, AC.

(Vibratory feeder is manufactured by Syntron Co., Dept. CP, Homer City, Pa. . . . or for more information reader may simply check 5754 on Reader Service slip which is located opposite last page.)

Why buy separate conveyors, feeders, elevators?

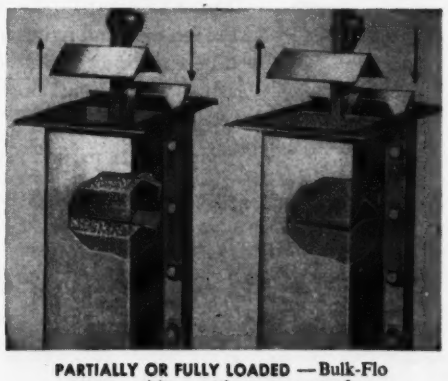


FIVE BULK-FLOS form an efficient system for handling material from unloading to storage, and into processing at this plant. Material is dumped directly into hopper of L-type Bulk-Flo, with no separate feeder needed. Note flexibility of distributing and reclaiming units to discharge and reclaim material at many points. Capacity here is 30 tph.

FUNCTIONING as a conveyor, a feeder and an elevator—all in one compact, enclosed assembly—Link-Belt Bulk-Flo saves the space and expense of individual units. Initial cost is much lower—so are power requirements. And because Bulk-Flo's flights operate in a close-fitting casing, you get positive movement of materials even when it's loaded to less than full capacity. Unlike other designs, feed can be varied to suit changing demands.

Bulk-Flo offers gentle handling as well. Material is carried and protected in individual "compartments"—degradation is minimized.

Your Link-Belt office or Book 2475 can quickly tell you how Bulk-Flo can fit into your plant.



PARTIALLY OR FULLY LOADED —Bulk-Flo assures positive, gentle movement of materials. Unit is self-clearing, minimizes contamination when handling different products.

LINK-BELT

BULK-FLO FEEDERS • CONVEYORS • ELEVATORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,808

When inquiring check 5755 opposite last page

VISCOUS MATERIALS Flow Freely

through

Steam-Jacketed EVERLASTING Valves

The EVERLASTING Steam-Jacketed Valve has proven outstandingly successful in handling many different kinds of viscous materials, such as tar, asphalt, pitch, paraffin, waxes, molten sulfur, etc.

Available in sizes 1½ in. to 6 in. inclusive, in iron body for 125 psi and cast steel for 150 psi.

For further details, write for Bulletin E-200.

For "everlasting" service, use

EVERLASTING *Valves*

EVERLASTING VALVE CO.
73 FISK STREET, JERSEY CITY 5, N. J.

EV350

When inquiring check 5756 opposite last page

Lift truck with push-pull attachment allows Stauffer Chemical Co. to realize savings with palletless handling of 100-lb bags on cardboard sheets

Stauffer Chemical Co., geared loading operation to palletless handling with an industrial lift truck. By using cardboard sheets instead of conventional pallets, their Chauncey, N. Y., plant . . .

CUTS TIME, LABOR COSTS IN LO

Problem: Getting 100-lb bags of chemicals loaded into freight cars easily, inexpensively, and rapidly presents a tricky problem to anyone concerned with material handling.

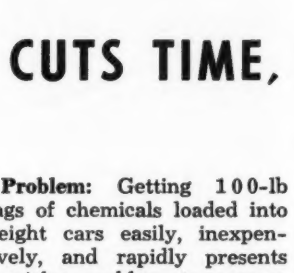
Stauffer Chemical Co.'s, Chauncey, N.Y., plant was using many slow, costly, and, in some cases, rather strenuous manual operations to transfer bags from warehouse into cars. Turnover in warehouse must be rapid, since they key production to customer demand.

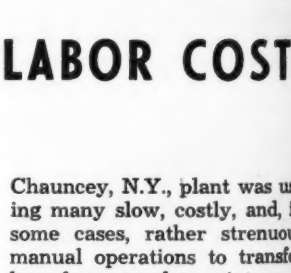
Solution: operation palletless industrial lift pull attach

As soon filled they cardboard wooden sk ventional capacity ga truck takes from war car.

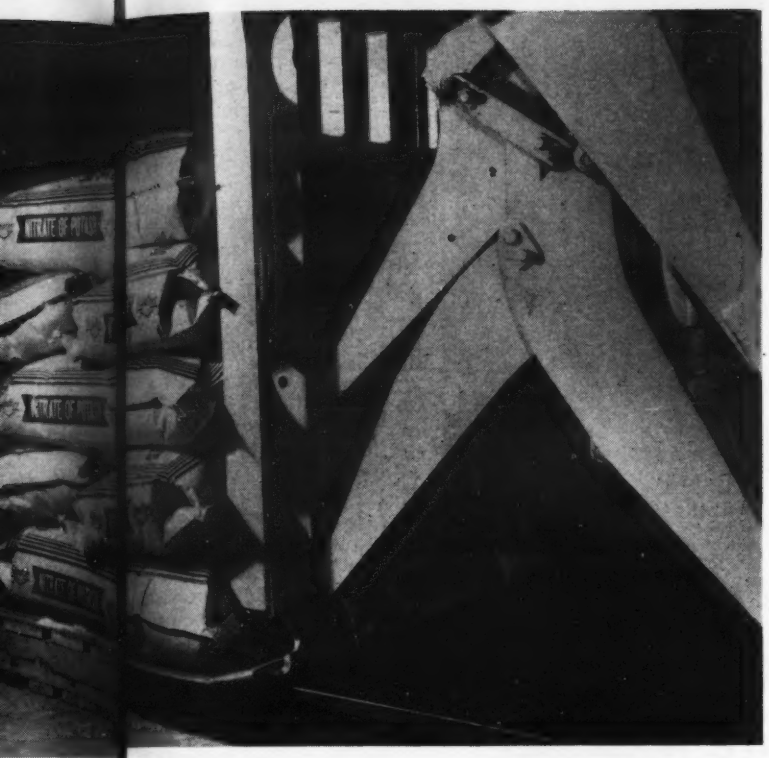
As opera load — eit or above stacked tw tends push the truck's below the

Hydrauli per bar at is lowered, sheet lip a is then ret





Side-shifter device permits load to be shifted 4" either side of center for placement against wall of car without excessive maneuvering of truck



COSTS

IN LOADING 100-LB BAGS

Solution: This phase of the operation is now geared to palletless handling on an industrial lift truck with a push-pull attachment.

As soon as the bags are filled they are stacked on cardboard sheets resting on wooden skids instead of conventional pallets. A 2000-lb capacity gasoline-powered lift truck takes over the handling from warehouse to freight car.

As operator approaches the load — either at ground level or above (skid loads are stacked two-high) — he extends pusher plate and sets the truck's broad forks just below the cardboard.

Hydraulically operated gripper bar at base of pusher plate is lowered, pinning cardboard sheet lip against forks. Pusher is then retracted, pulling load onto forks, with the truck moving forward slightly at same time to improve load stability.

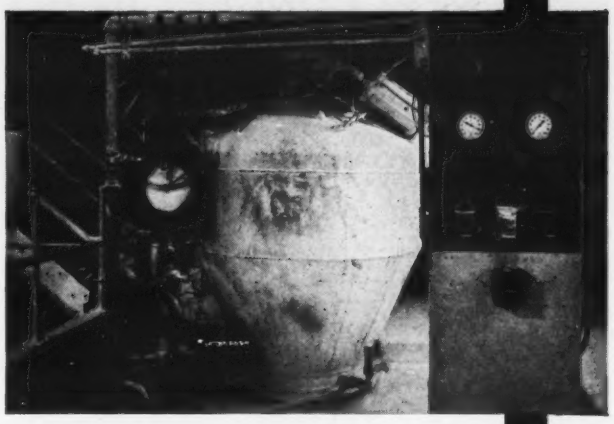
A Stauffer innovation has made the system even easier to operate. They have coated all wooden skids with Masonite to make cardboard sheets slide freely.

Unloading in car is reverse of loading process — the pusher plate simply moves load forward off forks onto car floor or, in rare cases, onto another load. Stauffer generally does not double-stack loads in cars since a full 40,000-lb carload can be made up with single layer of loads.

Push-pull attachment is equipped with side-shifter to make car-loading even simpler. Side-shifter moves load four inches either side of cen-

Turn to next page

Difficult Bulk Handling Job



...but well-handled by the

Robinson *Air-Activated* **Conveyor**

Product... abrasive chemical, ¼" to fine dust
Temperature... 600° F.

This Robinson Air-Activated Conveyor is installed in the plant of a well-known chemical company where it is conveying the hot chemical noted above . . . a job on which other means of handling, including pneumatic, either failed or proved inadequate.

Robinson operations can be made fully automatic and closely controlled by precise instrumentation.

The Robinson System—completely pneumatic, with gravity feed—offers several outstanding advantages for handling fine granular or dry powdered materials into, through and from the plant.

1 . . . products are handled gently; the mixture is 'fluidized'; particles are floated rather than blasted through the conveyor.

2 . . . only low volume of air is required; the average is less than 1 cubic foot of free air per pound of material conveyed.

3 . . . maintenance costs are exceptionally low; no moving parts such as motors, screws, shafts and bearings to require maintenance.

The Robinson Air-Activated Conveyor may be just what you need for pneumatically handling the materials at your plant. Investigate its possibilities. We can point to many successful installations. Write us in detail about your problem.

ROBINSON *Air-Activated* **CONVEYOR SYSTEMS**

A Division of Morse Boulger Destructor Co.

DEPARTMENT T, 80 FIFTH AVENUE • NEW YORK 11, N. Y.
Representatives in Principal Cities

When inquiring check 5757 opposite last page

Palletless Handling

Starts on page 190

ter, permitting perfect placement against wall of car without excessive maneuvering of truck.

Results: System has been in use about a year and has proven highly successful. In addition to time and labor savings realized, method has virtually eliminated breakage and has removed a potential cause of accidents. . . always a possibility with manual loading operations.

(Lift truck with push-pull attachment is manufactured by Yale & Towne Manufacturing Co., Dept. CP, 11000 Roosevelt Blvd., Philadelphia 15, Pa. . . . or for more information check 5759 on form opposite last page.)

Self-dumping hopper of 10 cu ft capacity fits narrow aisles

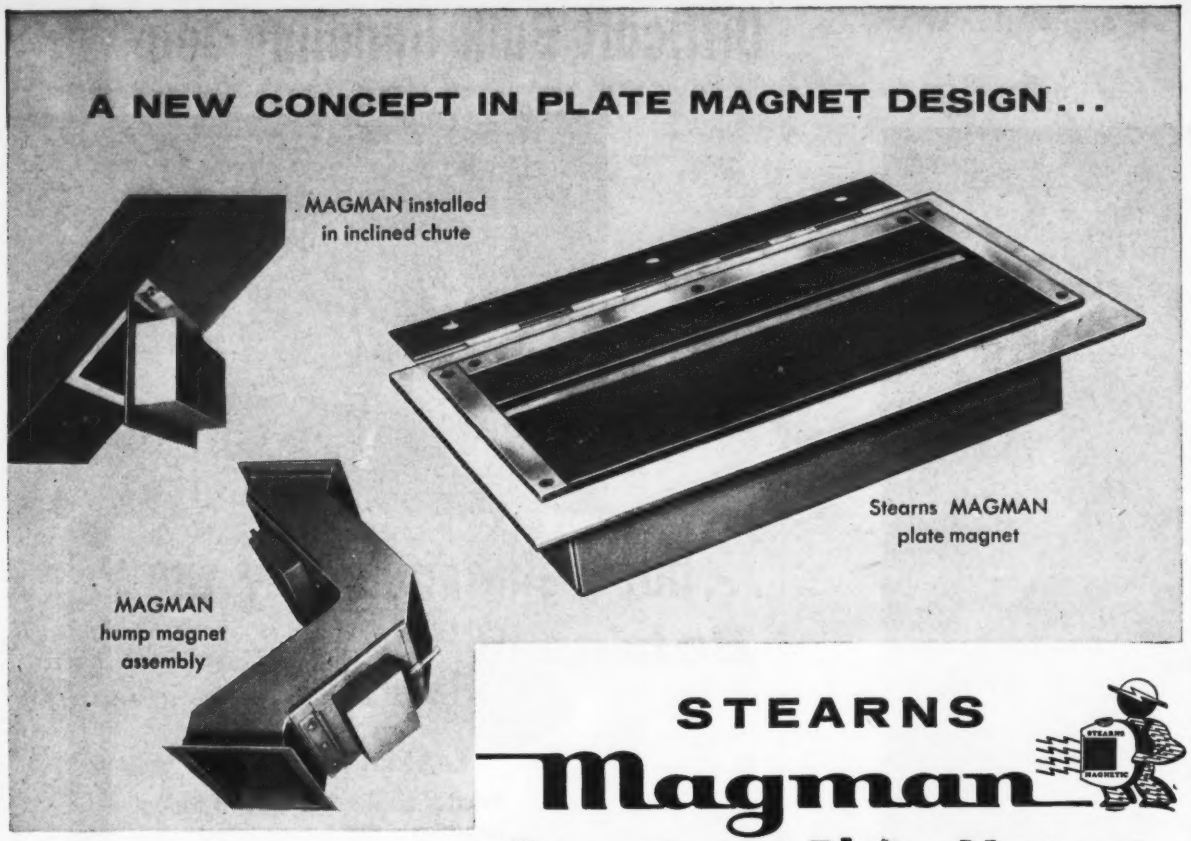
Can be pushed manually or carried by fork truck

Uses: Transporting and dumping bulk materials, scrap and waste.

Features: Measuring 30" wide, hopper is designed for narrow aisles or confined areas. Mounted on three casters, it can be pushed manually or transported by fork truck. Pockets built into frame permit entry of truck's forks.

Description: Self-dumping action is triggered when operator releases locking handle

Thanks to Charles J. Wolfenberger, Pine Bluff Arsenal, Arsenal, Ark.


A NEW CONCEPT IN PLATE MAGNET DESIGN...
MAGMAN installed in inclined chute
Stearns MAGMAN plate magnet
MAGMAN hump magnet assembly

STEARNS

Magman

Permanent Plate Magnet Boosts Efficiency 2½ Times!

Exclusive OFFSET magnetic air gap stops dangerous tramp iron ordinary plate magnets can't hold!

The secret of the amazing holding ability of the Stearns *Magman* is simple. Unlike ordinary plate magnets, the *Magman* employs an exclusive offset air gap feature that concentrates magnetic force right at the first pole piece. Tramp iron has no chance to speed up as it approaches the magnet face.

Does it work? Size for size, the Stearns *Magman* provides 2½ times the separating efficiency of any other unit — performance that makes ordinary plate magnets obsolete!

51

FREE BOOKLET HELPS YOU SELECT YOUR OWN MAGMAN

If your process involves handling flowing material in chutes, spouts, ducts or on conveyors, you'll want to know more about Stearns *Magman*. Write today for new, free booklet that gives complete details on construction features and performance, provides an easy method of choosing the right *Magman* for your plant. Ask for Bulletin No. 1071-P.

STEARNS MAGNETIC PRODUCTS

635 South 28th Street • Milwaukee 46, Wisconsin

When inquiring check 5758 opposite last page

Self-dumping hopper can be pushed manually or transported by fork truck

on rear of hopper. It rolls forward to dump its contents, then returns to upright position and automatically locks itself into position.

Empty weight is 450 lb, length is 49" and height is 40". Although standard width is 30", hopper can be made narrower for special installations. Capacity is 10 cu ft.

(Self-dumping hopper is manufactured by Roura Iron Works, Inc., Dept. CP, 1401 Woodland Ave., Detroit, Mich. . . . or for more information check 5760 on the convenient Reader Service slip which is located opposite last page.)

Continuous dryer conveys material by vibration

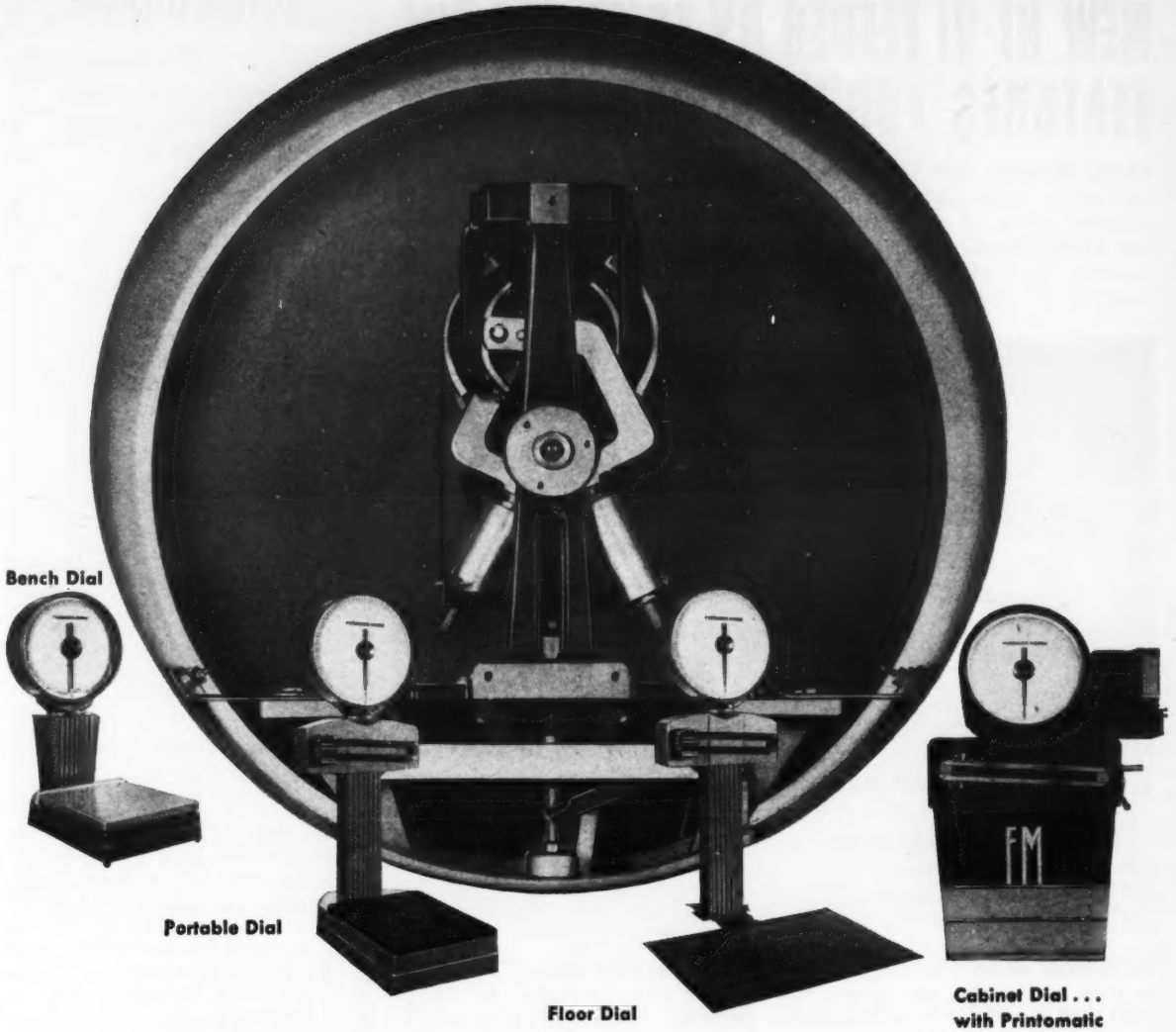
Uses: Drying chemical and pharmaceutical powders and crystals.

Features: Vibrating action of dryer gently conveys material through unit.

Description: Steam coils preheat drying air which is forced through screen on which material is conveyed. Vibrating hood or plenum chamber is provided to reduce air velocity and consequent dust losses.

Unit is constructed of stainless steel and is designed for easy cleaning.

(Vibrating dryer is manufactured by Carrier Conveyor Corp., Dept. CP, 192 N. Jackson St., Louisville, Ky. . . . or for more information reader may simply check 5761 on form which is located opposite last page.)



A NEW NAME FOR A NEW SCALE

Fairbanks-Morse Floaxial

Floaxial is a name created to describe a number of engineering principles applied for the first time to weighing machinery. The result is a scale better in exactly the ways you would want it to be better.

It is inherently more accurate; it is more immune to wear and shock damage; it is faster and more foolproof to operate; its precise answers are indicated so clearly that the chance for human error is all but eliminated.

For instance, the dial head swivels a full 360 degrees at the touch of a finger. The Floaxial dial will "look at you" squarely and invite you to read its answer truthfully.

Get the full story from your Fairbanks-Morse Scale Expert or write on your letterhead for the new bulletins about the new Floaxial scales. They show in detail why these are the best Fairbanks-Morse scales yet built. Address Fairbanks, Morse & Co., Dept. CP-9, 600 So. Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

When inquiring check 5762 opposite last page

NEW HI-VI FEEDER BY ERIEZ HAS THE FEATURES YOU'VE ALWAYS WANTED

REVOLUTIONARY NEW CONCEPTS in mechanical design and construction materials produced this outstanding new feeder. Based on results of field research, these new units incorporate many of the features asked for by people who use feeders. Available in a wide range of sizes to meet all needs, Eriez feeders give you higher operating efficiency over broader operating ranges—*let you move more materials faster!*

Patent Pending

- **Greater capacity than comparable size units**
- **Totally enclosed drive element**
- **Rust-proof long-life spring**
- **More uniform feed**
- **No rectifier needed**

NO RECTIFIER NEEDED! Just plug or wire in these new feeders; they operate at 3600 CPM directly off an AC line. No rectifier is needed, as a lifetime-powered magnet replaces this element by providing an automatic, inherent magnetic rectification system which is simple, trouble-free and highly efficient. All energy (a two-way push-pull vibrating action) goes for productive performance.

TOTALLY-ENCLOSED DRIVE ELEMENT: can't be damaged or lose efficiency due to contamination by moisture or foreign materials.

DISC-SHAPED GLASS FIBER SPRINGS: rust-proof, they're not subject to corrosion, "packing", fatigue or other critical characteristics of steel leaf spring systems.

GREATER OUTPUT CAPACITY: more work output than any other feeders of comparable physical size.

OTHER FEATURES INCLUDE:

Almost silent operation • Rectangular-shaped tray bottom for more uniform feed • Larger, more powerful Alnico V magnetic drive element • Compact base for tandem, side-by-side or back-to-back installations • Less sensitive to voltage change • No "air gap" adjustment needed • Units are lightweight, compact, easily installed • No sliding or rotating parts to wear • Low power consumption, maintenance and operating costs

An Eriez Feeder provides accurate, controlled feed of bulk materials variable from ounces to tons per hour — *automatically.* Works well with all types of materials: hot, dry, dusty, lumpy, abrasive, etc. Conveys, spreads, agitates, separates, blends, dries, cools and mixes—economically and in a minimum of space.

Only Eriez Feeders have HI-VI drive systems — powered by an Alnico V magnet that's permanent . . . will never wear out!

ERIEZ HI-POWR MAGNETIC SEPARATORS ERIEZ HI-VI VIBRATORY EQUIPMENT

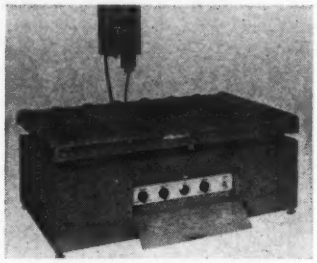
Interesting new booklet tells all about the Eriez line. For your free copy, write to Eriez Mfg. Co., 73-WV Magnet Dr., Erie, Pa.

When inquiring check 5763 opposite last page

Indicates short weight 50-, 100-lb packages on conveyor line

Uses: Indicates correct or short weight of package (in range of 50 or 100 lb).

Features: Electronic device can be modified to count overweight, underweight, and correct-weight packages. It can also be modified for handling weight data in tabulated or digital form.



Electronic checkweigher indicates short-weight packages on conveyor line

Description: Within ½ sec after load is fully applied, instrument will indicate weight with reported accuracy of better than one part in 1000. All required settings within range of ¼ to full capacity of scale are made by setting dials on control panel — no internal adjustment of scale mechanism is required.

Green light indicates correct weight, and red light and chime can be set up to indicate either underweight or overweight.

Case dimensions are 18 x 29½ x 8¼"; platform is conveyor section 18" wide, 30" long, 12" high, with eight 2"-diameter aluminum rollers on 4" centers.

An auxiliary electrical output signal from scale is available to actuate automatic conveyor systems for rejecting short-weight packages, marking packages, or stopping conveyor line.

(Electronic checkweigher is manufactured by Triner Scale and Mfg. Co., Dept. CP, 2716 W. 21st St., Chicago 8, Ill. . . . or for more information about manufacturer's product reader may simply check 5765 on form opposite last page.)

Vinyl coating process for elevator buckets

Elevator buckets can now be protected with a smooth, durable coating of vinyl, thanks to development of new process. Because there is practically no tendency for material to adhere to vinyl, coating helps make buckets self-cleaning.

Vinyl coating also protects against rust and has high abrasion resistance. Longer bucket life and reduced maintenance result where corrosive, abrasive, sticky or wet material is being conveyed.

(Vinyl coating process was developed by The Bauer Bros. Co., Dept. CP, Springfield, Ohio . . . or for more information check 5764 on form opposite last page.)

Battery-powered fork-lift truck has 85" turning radius

8000-lb-capacity model will travel loaded at 5½ mph

Uses: Carrying and stacking loads up to 8000 pounds.

Features: Truck has turning radius of 85". With four speeds forward and four reverse, and with 36 volt battery it will travel loaded at 5½ mph and climb a ten percent grade.

Description: Power is from dual-field, high-torque motor. There are three independent braking systems: In addition to hydraulic brakes, a "dead-man" brake mounted on drive-motor armature applies automatically when operator leaves the seat . . . and truck can be braked by reversal of power in first speed. Automatic valve in hydraulic system prevents drifting of uprights under heavy loads. Weight is 11,790 lb with lead-acid battery and 11,588 lb with alkaline battery.

(Battery-powered fork truck, EUT-8024, is manufactured by Electric Truck Section, Industrial Truck Division, Clark Equipment Co., Dept. CP, Battle Creek, Mich. . . . or for more information check 5766 on form opp. last page.)

from platform truck . . . to hand truck

Uses: As either a 2-wheel upright hand truck or a 4-wheel horizontal platform truck for movement of loads.

Features: Conversion is accomplished by quick, easy adjustment of handle.

Upright 2-wheel hand truck easily converts . . .

. . . to 4-wheel platform truck for handling heavy loads

Description: Truck is equipped with two cup-and-cone ball-bearing 8-in wheels with protective steel discs and with two heavy duty swivel casters with 3-in self-lubricating bearing wheels.

As upright truck, handle can be locked in extended position for large loads or in retracted short-handle position for normal use. To convert to platform truck, handle is pulled out completely and reinserted at right angles.

(Trukcart is distributed by R. W. Westerfield & Co., Dept. CP, 228 W. Kinzie St., Chicago 10, Ill. Check 5767.)

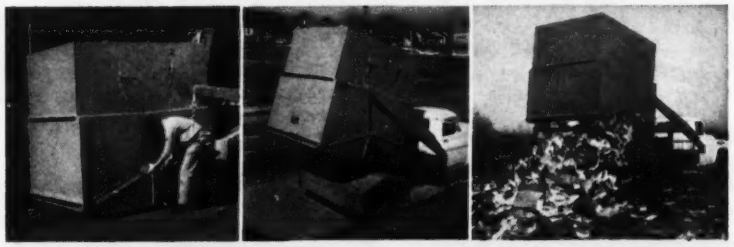
Among the thousands of users...

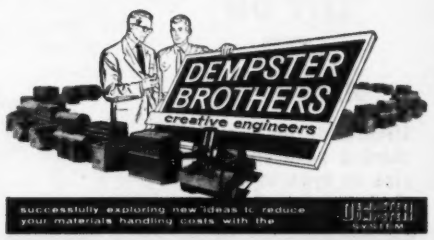
THE DEMPSTER DUMPSTER® SYSTEM

Helps Make Possible Plant-Wide Cleanliness and Sanitation at . . . ELI LILLY and COMPANY

Noted for its plant-wide cleanliness and sanitation, Eli Lilly and Company attributes much of the success of its efficient, sanitary handling of bulk materials to the Dempster-Dumpster System. In addition to the fire hazards, the unsanitary waste material accumulation and collection with conventional methods, the high cost of handling constitutes a further problem for many manufacturers. Thousands of users like Eli Lilly and Company have found the Dempster-Dumpster System helps to solve all these problems! One truck-mounted Dempster-Dumpster serves scores of big steel detachable containers, one-after-another. There is a container available or that can be built to suit the requirements of all materials, regardless of description. And one man, the Dempster-Dumpster driver, handles them all! Capacities up to 21 cu. yds. Payloads up to and over 36,000 lbs. Ask us to forward complete literature. Manufactured by Dempster Brothers, Inc.

Picking Up, Hauling and Dumping a 15 cu. yard Universal Container.




DEMPSTER BROTHERS
creative engineers
successfully exploring new ideas to reduce your materials handling costs with the
DEMPSTER DUMPSTER SYSTEM

DEMPSTER BROTHERS, 297 N. Knox, Knoxville 17, Tennessee

CESCO JR. DUMPERS

LIFTS and DUMPS

CESCO DUMPERS

BAGS • BOXES
DRUMS • BULK
REMOVABLE BOX TRUCKS
Loads Bins, Batchers and Mixers

CESCO Jr. is a fast, lightweight machine that can handle seventy-five 400 pound loads per hour. It can be equipped as a multi-purpose machine with changeable skips for handling drums, bags, etc. or is available with any one skip for single purpose operation. Standard portable models dump at heights from 2 to 8 feet and stationary models dump at heights from 2 to 16 feet. Special models available for any height required. Cesco Jr. is powered by a ½ h. p. motor (3 phase or single phase) and features standard push button controls. For more details write for our free catalog.

ESSEX CONVEYERS, INC.
165 Franklin Avenue, Nutley 10, N. J.
COLSON EQUIPMENT & SUPPLY CO.
1317 Willow Street, Los Angeles 13, California

When inquiring check 5768 opposite last page

A modern truck for modern plants
The HydroLectric
with most modern features

- 2 Drive Wheels instead of one
- 2 Braking Systems available instead of one
- 4 Wheel Stability instead of three
- Alloy Gear Transmission instead of chains
- 100% more Steering Ease —Greater Maneuverability
- 50% less Maintenance —Easy Accessibility
- Finger-Tip Control —Greater Safety

Put these modern features to work for you, greater profit at no additional cost.

Platform Model K

Write for Bulletin KW

STUEBING Designed • Engineered • Built

LIFT TRUCKS, INC. / CINCINNATI 14, OHIO

THERE IS A TRUCK FOR EVERY PURPOSE TO HANDLE ANY KIND OF MATERIAL.

When inquiring check 5770 opposite last page

USE THE LIFT-O-MATIC POWER TRUCK ATTACHMENT for HANDLING DRUMS with a POWER FORK TRUCK

WITH FORKS LEFT ON OR REMOVED

Simple, automatic, mechanical handling of any size or type of drum—single or multiple.

WRITE FOR CATALOG — **MARVEL INDUSTRIES, Inc.** 2234 CLEVELAND ST., EVANSTON, ILLINOIS

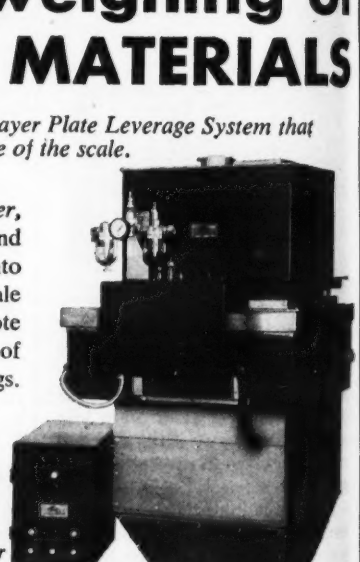
When inquiring check 5769 opposite last page

Automatic weighing of FLOODING MATERIALS

Only Thayer Scales have the Thayer Plate Leverage System that is guaranteed accurate for the life of the scale.

Flooding powders, *and even water,* can be positively controlled and accurately batched or filled into containers with this Thayer Scale Autoweighting System. Remote controls permit quick changes of materials and weight settings. Amazing accuracy is retained regardless of shocks or surrounding dust conditions. Please write for engineering data.

MODEL B-36R *Models available for batches from 5 to 5,000 lbs.*



THE Thayer SCALE

BATCHING • FILLING • CHECKING — AUTOMATICALLY BY WEIGHT

AUTOWEIGHTION

THE THAYER SCALE CORP., 6 Thayer Park, Pembroke, Mass.

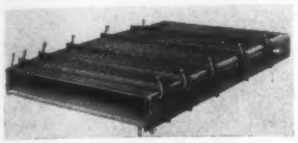
When inquiring check 5771 opposite last page

Evenly distributes temp to heat, cool traveling conveyor belt

Unit is made up of standard thermo-panels

Uses: Heating or cooling all sides of traveling conveyor belt.

Features: Design is such to give even distribution of temperature around conveyor belt. Made up principally of standard thermo-panels, unit takes



Heater-cooler for traveling conveyor belt is made up of sectional thermo-panels

place of regular sheet metal and pipe coil designs. Less cost, less weight, and easier installation are reported.

Description: Unit consists of two sheets of specified metal, welded together. Before welding, one or both sheets are embossed. Embossings create flow channels for steam, water, or other mediums used for heating or cooling.

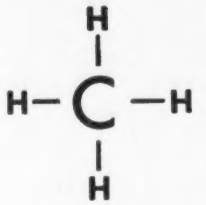
Inside sheet can be of stainless steel while outside is carbon steel. Jointed sectional construction makes possible any required length.

(Thermo-panel conveyor belt heater is manufactured by Dean Thermo-Panel Coil Div. of Dean Products, Dept. CP, 616 Franklin Ave., Brooklyn 38, N.Y. . . . or for more information check 5772 on form opposite last page.)

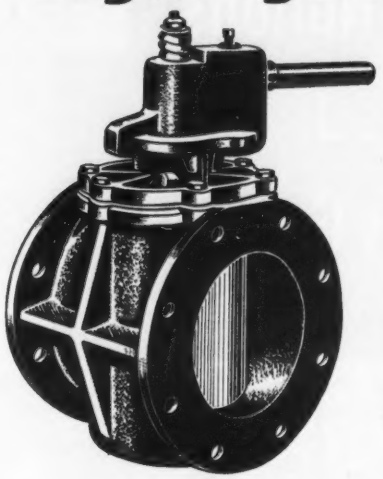
Hand-lift truck book

Basic 20-page book tracing development of mechanical and hydraulic hand-lift trucks, tells what they are, how they operate, how to select them, and how to use them. "Mechanical and Hydraulic Hand-lift Trucks" — Association of Lift Truck And Portable Elevator Manufacturers, Dept. CP, Suite 759, One Gateway Center Pittsburgh 22, Pa. Check 5773.

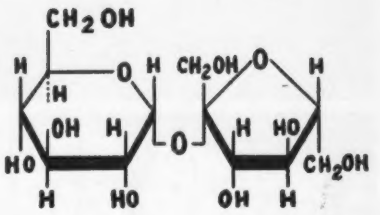
Dry solids...
Heavy slurries...
Light gases...



NaOH



$CaCO_2$



...you can pipe them all through

DeZurik EASY-OPERATING NON-LUBRICATED Plug Valves!

DeZurik Valves are the ONLY plug valves with ECCENTRIC ACTION—guaranteeing easy operation and tight shut-off WITHOUT LUBRICATION!

Dry material, heavy slurries or gases are closed off tight by the resilient-faced plug, or passed with an easy quarter-turn—without contamination from lubrication!

CLOSE TIGHT

The resilient-faced plug in a DeZurik Valve guarantees dead-tight shut-off on any line despite hard particles in the flow. The cushioned closure seals around particles—dead-tight performance is the same whether valving thick slurries, clear liquids or gases.

OPEN EASILY

Eccentric Action, found only on DeZurik Valves, accounts for the easiest operation ever! Pivoted eccentrically, the plug touches the seat only when the valve is closed. Opening the valve backs the plug away from the seat—no friction to overcome, no drag, no binding—WITHOUT LUBRICATION!

NEED NO LUBRICATION

Tight shut-off and easy operation result from the basic design of the valve and the resilient-faced plug. Lubrication is not necessary—either to get tight shut-off or easy operation. No greases or guns to stock, no constant lube maintenance —no product contamination from lubrication!

DeZurik Valves are manufactured in sizes ½" through 20" and in a full range of metals, including rubber-lined models. Valves can be operated manually or by a complete line of remote operators. Representatives in all principal cities or, for further information, write to

DeZURIK CORPORATION
SARTELL, MINNESOTA

When inquiring check 5774 opposite last page

Here's the Nation's NO. 1 Nitrogen Gas Generator

Only Gas Atmosphere's new Nitrogen Generator has all the features you have asked for in a production generator. It comes as a COMPLETE PACKAGED UNIT ready to be set on stream with a minimum of make ready. EXCLUSIVE AUTOMATIC TURN-DOWN enables production coincident with demand, eliminating gas waste. SIMPLIFIED RATIO CONTROL assures uniform gas analysis always. SINGLE BURNER OPERATION means easier combustion control. This new generator develops HIGHEST PURITY NITROGEN and, where required, CO_2 can be obtained from the same unit simultaneously. Here is truly the nation's top nitrogen generator. Be sure you look into it before you buy.

gas Atmospheres, inc

equipment for producing industrial gases

20011 WEST LAKE ROAD CLEVELAND 16, OHIO

When inquiring check 5775 opposite last page

Indoor
equippe

Management at Nitrogen Div., of Allied Chemical and Dye Corp., recognized advantages of using power equipment for indoor bulk handling. By using a catalytic muffler for removal of dangerous exhaust gases, they obtained . . .

safe indoor use of gas-powered equipment

Problem: Management at Nitrogen Div., of Allied Chemical & Dye Corp., Hopewell, Va., recognized the saving that could be obtained by mechanization of handling of bulk materials and bags both inside and outside storage and processing areas. Gasoline powered fork trucks and tractor-shovels were favored, but indoor use would have had to be restricted because of potentially dangerous exhaust fumes. Numerous situations existed where it was desirable for material to be moved from

freight ca
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Solution:
engineers
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on gas po
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Cata

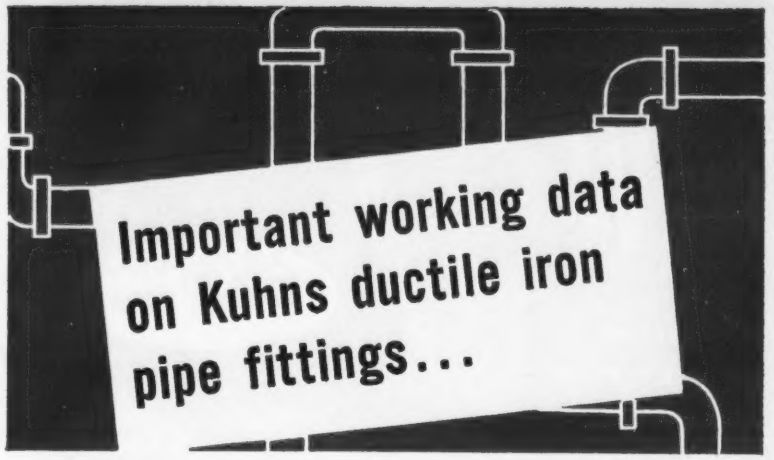
Indoor bulk handling of fertilizer is possible using tractor-shovel equipped with catalytic muffler which removes carbon monoxide and hydrocarbons from exhaust gas

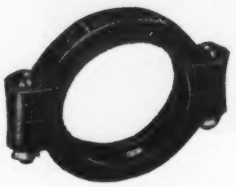
freight car or outdoor storage directly to processing area inside. Use of duplicate equipment powered by other means for these situations would have been expensive.

Solutions: Company safety engineers recommended installation of catalytic mufflers on gas powered equipment to remove harmful gases from exhaust. Success of catalytic exhaust purifier rests on its ability to rid engine fumes of carbon monoxide and hydrocarbons. It consists of a number of cartridges each containing 71 porcelain rods coated with an effective oxidation catalyst. Rods are teardrop shaped to minimize back

Turn to page 201

Catalytic muffler, extreme right of engine compartment, fits within space limitations of equipment





"K" Pipe Lock Couplings

Listed for 800 psi working pressure by Underwriters' Laboratories, Inc., "K" couplings have a safety factor of five times the UL listing for 2½" through 6" and four times the UL listing for 8". Sizes: 2½" through 8". Look for the "800 D" on each.

"K" Flanges and Flanged Fittings

Elbows, base elbows, 45° elbows, side outlet elbows, tees, side outlet tees, and reducers in straight and reducing sizes. Pressure rating, 500 psi by Underwriters' Laboratories, Inc. Flat faced flanges shipped as standard. Extra heavy flange dimensions and raised faces available on request. Look for the "DI 500" on each.

"K" Screwed Fittings

Pressure ratings listed by Underwriters' Laboratories, Inc.

STEAM AND OIL AT 550°F
¼" to 3".....300 lbs.
LIQUID AND GAS AT 150°F
¼" to 1".....2000 lbs.
1¼" to 2".....1500 lbs.
2½" to 3".....1000 lbs.

Note: These fittings are excellent for liquefied petroleum gas systems. Look for the "D 300" on each.

WHEN TO USE: Where structural strength and thermal shock resistance are specified. When high pressure sealing is vital to reduce hazards such as fire and explosion. To prevent leakage due to wide temperature changes, vibration and misalignment. Where rust and corrosion are problems. When fittings are to be reused. As Kuhns supplies cast, malleable and ductile iron fittings, these are impartial engineering recommendations.

Send for our catalog on ductile iron pipe fittings—the newest development in the industry. Available at better wholesalers.

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1800 McCALL STREET, DAYTON, OHIO

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When inquiring check 5776 opposite last page

FACTORY MUTUAL APPROVED FOR THE ULTIMATE IN SAFETY

NEW

CHEMICAL FAUCET FOR FLAMMABLE AND CORROSIVE FLUIDS

Kel-F† SEALS

FUME TIGHT STAINLESS STEEL* FAUCET OVERCOMES SEIZURE PROBLEMS

Here is a faucet designed for minimum maintenance and the ultimate in safety for dispensing solvents, essential oils, chlorine-free bleaches, oxidizing agents, caustic solutions and many acids. They are in use in individual and central dispensing systems in laboratory, production and liquid storage areas throughout the chemical process industries.

Liquid dispensing at an Eastman Kodak storage area. More than 200 solvent* storage drums are equipped with Economy chemical faucets.

LOOK AT THESE FEATURES:

- **NO AFTER DRIP — Kel-F "O" ring seals are inert to chemical exposure.**
- **DESIGNED FOR SAFETY — Anti-flash screen prevents flame propagation in dispensing flammable liquids.**
- **EASILY CLEANED — Disassembled in minutes, the faucet can be chemically and/or steam sterilized.**
- **LOW MAINTENANCE — Corrosion resistance with few moving parts assures long life.**
- **FACTORY MUTUAL APPROVED — Your assurance of quality construction and safe operation.**

Write for complete information including detailed test report by Factory Mutual Laboratories.

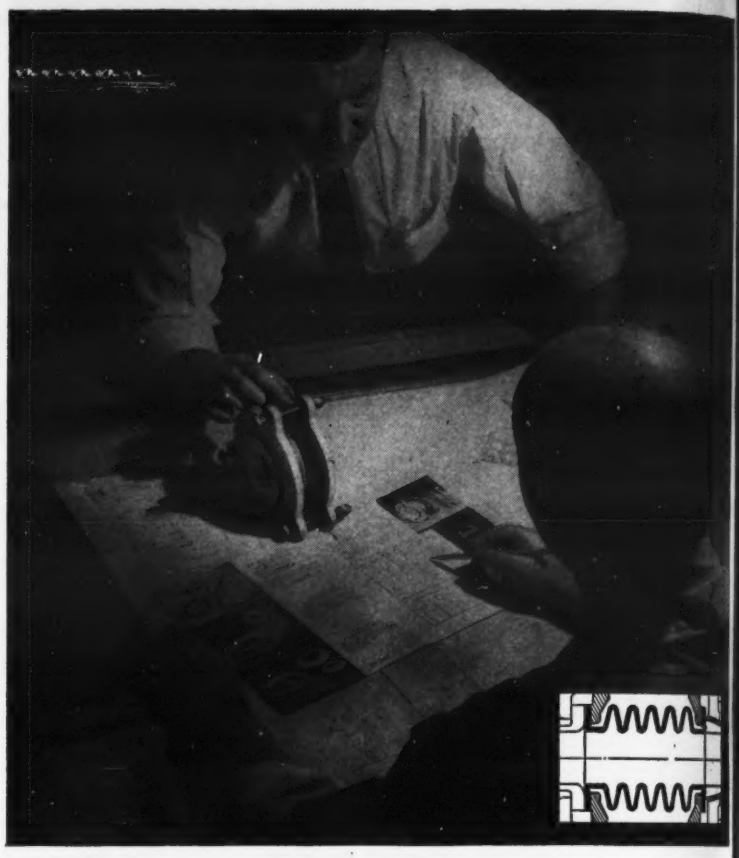
** Also available in chrome-plated brass †M. W. Kellogg trademark for fluorocarbon resin*

ECO ENGINEERING DIVISION

economy FAUCET CO.

12 NEW YORK AVE.
NEWARK 1, NEW JERSEY

When inquiring check 5777 opposite last page



R/M "TEFLON"* ...

surest protection for your costly process equipment

For maximum safety, specify R/M "Teflon" Expansion Joints and Flexible Couplings in your critical fluid lines. Because of the unique qualities of "Teflon," these connections are impervious to all known industrial acids, caustics and solvents. They are non-contaminating and have zero water absorption. An outstanding feature of their construction is the convolution design diagrammed above. This gives high resistance to vibration, thermal expansion and contraction, and fatigue. Special limit-bolt arrangement prevents damage to pipes. Available in sizes from 1 to 12 in.

R/M engineers are experts on fabricating "Teflon" in combination with asbestos and other materials, and will be glad to help you with special problems. Write today for booklet on R/M "Teflon" Accessories for Chemical Handling Equipment. *Du Pont trademark

R/M MAKES A COMPLETE LINE OF MECHANICAL PACKINGS—Vee-Flex, Vee-Square, Universal Plastic, and "versi-pak"®; GASKET MATERIALS, "TEFLON" PRODUCTS, including flexible wire-braided and rubber-covered hose. SEE YOUR R/M DISTRIBUTOR.

R/M **PACKINGS**

RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, PASSAIC, N.J.
MECHANICAL PACKINGS AND GASKET MATERIALS

FACTORIES: Passaic, N.J.; Bridgeport, Conn.; Manheim, Pa.; Neenah, Wis.; No. Charleston, S.C.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Mechanical Packings • Asbestos Textiles • Industrial Rubber • Engineered Plastics • Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

When inquiring check 5778 opposite last page

Catalytic Muffler

Starts on page 198

pressure. They are staggered in position to present maximum surface for combustion. Required number of cartridges, determined by displacement of engine, are encased in an explosion-proof shell fitted with an air intake assembly to provide sufficient oxygen for catalytic combustion of engine contaminants.

Only change necessary in equipment is use of white instead of leaded fuel. On equipment fueled with LP gas, no change is required. Mufflers were installed within space limitations of existing acoustical muffler or as a direct attachment to engine exhaust manifold. At governed speed, elimination of carbon monoxide is 92.2%, at idle speed 97.3%. Back pressures are equivalent or less than standard mufflers. Operating life is usually 2000-2500 hours with no maintenance.

Results: Gas-powered equipment can be used in storage buildings and warehouses for handling bulk materials in addition to materials handling outdoors. As a result, company is realizing maximum utilization of power equipment. Plant safety engineers have approved them for use, with periodic inspections, inside closed storage buildings and warehouses. Employees can now work inside while trucks are in operation without any danger of ill effects from exhaust fumes. Efficiency in material handling has been greatly improved with a small capital investment.

(OCM Catalytic Purifiers are a product of Oxy-Catalyst, Inc., Dept. CP, Wayne, Pa. . . . or for more information check 5779 opposite last page.

Controlling TDI vapors

Portable detector kit for low concentrations of TDI (toluene diisocyanate) and TDI-urea vapors in air is described in two-page bulletin. Bul 0811-4 — Mine Safety Appliances Co., Dept. CP, 201 N. Braddock Ave., Pittsburgh 8, Pa. Check 5780.

REDUCE OVEN EXPLOSION HAZARD

Bifurcator® fan exhausts work chamber vapors

Don't take a chance with *any* industrial oven. Install a Bifurcator fan to prevent vapors from accumulating in the work space and forming an explosive mixture. Remember, factory fire insurance companies say a positive fan *is* necessary to exhaust dangerous vapors, even though the oven may have a recirculating fan.

And here's important news: DeBothezat Fans are guaranteed to perform in accordance with their current published ratings — and this guarantee is backed by a $250,000.00 performance bond on deposit with The New York Trust Company.

De Bothezat FANS
A DIVISION OF
American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

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DeBOTHEZAT FANS DIVISION
American Machine and Metals, Inc.
Dept. CP-957, East Moline, Illinois

Yes, send me catalog and full data on the Bifurcator fan for exhausting explosive or flammable vapors.

FIRM

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CITY ZONE STATE

ATTENTION MR.

IN CANADA: Represented by DOUGLAS ENGINEERING CO., Ltd., Toronto • Montreal

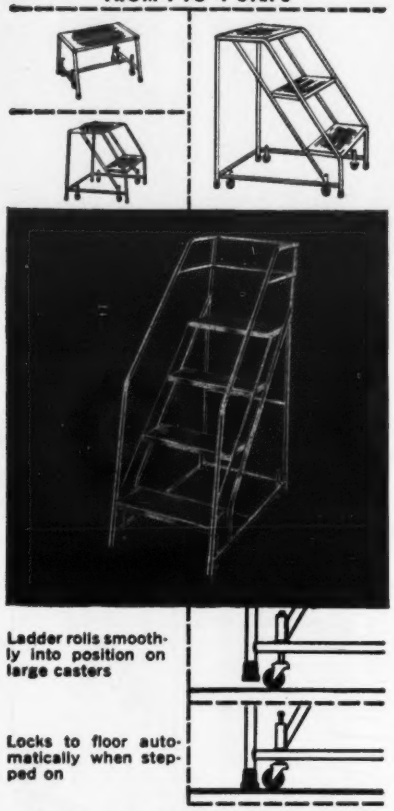
When inquiring check 5781 opposite last page

ALL ALUMINUM

LIGHT WEIGHT RUSTPROOF EASY ROLLING

BALLYMORE SAFETY-STEP LADDERS

FROM 1 TO 4 STEPS



Ideally suited for many jobs indoors or out where cleanliness, light weight and smart appearance are important. Sturdy all-aluminum construction reinforced for maximum strength. All parts electrically welded, no rivets or bolts to loosen. Safe, long-wearing, solid rubber-covered steps.

They are easily moved about on rollers but with no danger of "kick-out." Wide-base, rubber-tipped legs grip the floor so ladders are always stable and secure when in use.

Made in four sizes, seven models for average work levels up to 8'. Handrails are offered on the three and four step models for greater safety.

Write for complete specifications to Ballymore Company, West Chester 10, Pa.

BALLYMORE LADDERS

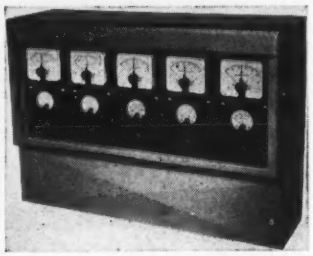
THE STANDARD BY WHICH SAFETY LADDERS ARE JUDGED

When inquiring check 5782 opposite last page

Gas detection unit has flexibility of size, design

Uses: For warning against excessive accumulations of harmful gases.

Features: Flexible unit may be designed to open or close valves, turn on fans, open doors, or operate other electrically controlled devices.



Gas detection unit may be large or small, operate variety of warning devices

Description: Gas detection unit consists of an instrument control board and detector stations connected to control board with three-wire conductor cable.

(Permanent gas detector, Model 520, is product of Atlas Laboratories, Inc., Dept. CP, Houston, Texas . . . or for more information check 5783 on form which is located opposite last page.)

Light-weight pump can be quickly moved to fire

Removable wrap-around aluminum handles protect unit

Uses: For extinguishing fires.

Features: Light weight and portability of unit permit its use on fires or at water sources a pumper cannot reach. Removable wrap-around aluminum handles protect pump from roll-over damage and permit easy carrying.

Description: Powered by 4-cycle, 9-hp gasoline engine, pump will prime in 15 to 30 seconds, depending on suction lift. It has over 100 lb pres-

SAFE *moisture and fume removal*

Three outstanding features make Air-Van Power Exhausters especially suited for exhausting moisture and corrosive fumes.

- A patented scroll design assures positive air removal. Gallaher Air-Vans are designed to handle up to 65,000 CFM at static pressures to 4".
- The motor is out of the air stream.
- A patented air seal-off protects the motor by creating a constant curtain of fresh air around the motor shaft. This prevents any fumes from entering the motor housing.
- Other Air-Van features include quiet operation, low silhouette, weatherproof design, availability in special metals and finishes and certified ratings based on actual physical tests.

Patents 2188741 2526290
Patents pending

The GALLAHER Company

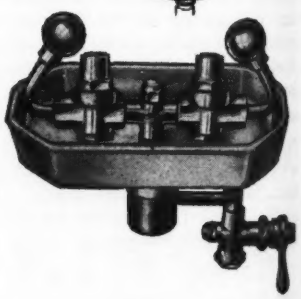
4108 Dodge Street Omaha, Nebraska
Export Office: 306 Paul Bldg., Utica 2, N.Y. Cable "Kaiserquip"

When inquiring check 5784 opposite last page

THERE'S DANGER IN "TIME"

HAWS EYE-WASH FOUNTAINS

Time elapsing between the accident and arrival of medical aid, is too often a cause of permanent eye injury. Bridge this time gap with a HAWS Emergency Eye-Wash Fountain. Installed at convenient locations, these HAWS safety devices are instantaneously ready when such accidents occur.



The HAWS Eye-Wash Fountain washes injurious chemicals out of the eyes with clean water at controlled pressure and volume. It is also available with Drench Shower Attachment...completing an emergency station for your employees' protection.

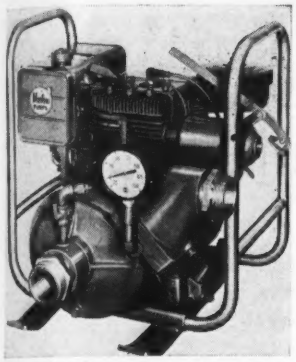
Designed and manufactured in cooperation with leading safety engineers

WRITE TODAY for brochure and full details

HAWS **DRINKING FAUCET CO.**

1439 FOURTH STREET (Since 1909) BERKELEY 10, CALIF.

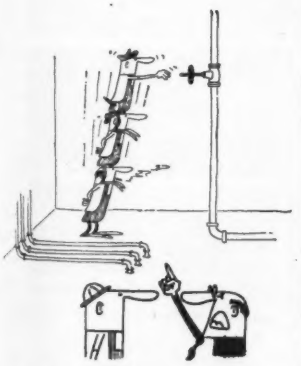
When inquiring check 5785 opposite last page



Portable fire pump can be easily carried in car trunk for fires or water sources where pumper can't be used

sure available for fog or foam operation. Pump may also be used for booster service. It will relay enough water through 300' of 2½" hose, and up 75' hill, to supply pumper operating two ½" nozzles at 100 lb pressure.

(Portable fire pump is product of Marlow Pumps, Div. of Bell & Gossett Co., Dept. CP, Midland Park, N.J. . . . or for more information check 5786 on form which is located opposite last page.)



"I don't care how good they were in vaudeville — next time they use a ladder."

Cartoon submitted by Charles J. Wolfenberger, Pine Bluff Arsenal, Arsenal, Arkansas

5 QUALITY LINES 1 DEPENDABLE SOURCE

WIL-GARD® INDUSTRIAL GLOVES

Why shop around? Specify Wil-Gard Industrial Gloves—the complete line with 60 different styles and compositions. *Write today* for the *new* Wil-Gard Catalog. It tells you how to choose the right gloves for 207 common industrial chemicals.

Sold only through distributors

WR-957-16-C

COMPAR PLASTIC Free from sulfur—won't tarnish metal. Resists petroleum-base degreasing agents. Six styles.

LATEX *Tan Latex* for most water solutions of acids, alkalies, salts, and in ketones. Six styles. "*Kanry-Tex*," for heavy-duty cannery service. Two styles. *Tanners Mittens*. Two styles. *White Surgical Latex* for delicate work. Eight styles.

NATURAL RUBBER *Gauntlet Type Acid Gloves* with high rubber content. Six styles. *Industrial Gloves* with reinforced fingers and palms. Two styles. *Linemen's Gloves* with superior dielectric strength. Ten styles.

NEOPRENE Superior in oils, greases and petroleum solvents. Ten styles.

BUNA-N For many of the same uses as Neoprene—even more versatile. Seven styles.

LATEX AND NEOPRENE FINGER COTS

THE WILSON RUBBER COMPANY
INDUSTRIAL DIVISION • A Division of Becton, Dickinson and Company
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Falcon®
"Sounds for Safety"

AUTOMATIC HIGH-LEVEL alarm prevents costly, dangerous overfilling of petroleum, chemical, water, other liquids in fixed- and floating top, indoor and outdoor, mixing, storage tanks. Safe, reliable gas-powered horn audible for one-half mile and more.

MANUALLY-OPERATED, gas-powered signaling horns ideal for emergency and 1,001 other uses. Self-contained units are highly portable, entirely reliable. Non-electric operation permits use in hazardous vapor areas. Small units feature disposable Freon cans.

NEW AUTOMATIC fire detecting systems and units give early warning in case of fire. Heat activates any single Freon-powered detector in system, instantly sounds horn. Ideal for homes, institutions, commercial, industrial buildings. U/L approved, low cost.

DEALER TERRITORIES OPEN
Falcon Alarm Co., Inc.
243 Broad St., Summit, New Jersey

When inquiring check 5788 opposite last page

IF YOU USE THESE PRODUCTS
send for the world's most complete, illustrated catalog of
ELECTRIC LANTERNS and SAFETY CANS

VALUABLE DATA:
The world's first comprehensive table of lamp and battery operating information
High power searchlights
All-purpose hand lights
Safety lights and lanterns
Flammable liquid SAFETY CANS
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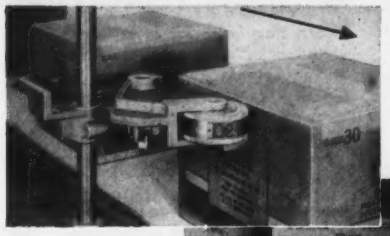
JUSTRITE Mfg. Co.
2061 N. Southport, Chicago, Ill.
CATALOG NUMBER 569-S9

When inquiring check 5789 opposite last page

Low-cost marking attachments save thousands of $ every year



ROLACODER twin-action markers... for imprinting codes and lot numbers on 2 or 4 sides of cases simultaneously ...without requiring cases to be turned.

ROLACODER single-side marker for accurate spot imprinting of brand names, varieties, code-dates, lot numbers on cases, cartons, fibre drums, bags, etc.

Friction-driven ROLACODER markers do your marking automatically ... save cost of manual stencilling or stamping. Designed for easy do-it-yourself installation on existing conveyor lines, case-sealers, etc. They use quick-change rubber type or dies, hold 8-hour ink supply.

Write for descriptive Bulletin "ROL"

Gottscho **ADOLPH GOTTSCHO, INC.**
Dept. W, Hillside 5, N. J.

Automatic Production-Line CODING, MARKING, IMPRINTING MACHINES
In Canada: RICHARDSON AGENCIES, LTD., Toronto & Montreal

When inquiring check 5790 opposite last page

Clearsite PLASTIC
VIALS & JARS

Get Better Packaging and Lower Packaging Costs

Among the wide range of shapes, sizes, closures, and colors we now produce, there's one that will fit your needs—*without* mold costs.

Jewel-colored Clearsite containers are moisture-tight, dust-proof, easy to multi-color print. Because they are shatter-proof, they minimize breakage cost —their light weight means lower shipping charges.

Write for free samples and descriptive literature to Dept. G.

CELLUPLASTIC CORPORATION
Sales and Executive Offices • Newark, N. J.

When inquiring check 5791 opposite last page

Flexibility for packaging, shipping in bag or bulk...

... that's the feature of A. E. Staley's versatile starch packing and loading facilities. With this system, pallet or palletless bag shipments and bulk loading of both box and hopper cars are easily handled

GEORGE V. MICHAEL, Assistant Editor
With **ROBERT SCHWANDT** Assistant Supt.
Dry Starch Section
A. E. Staley Company, Decatur, Illinois

Problem: When demand for starch in bulk shipments increased, A. E. Staley, Decatur, Ill., didn't have packaging and shipping capacity or flexibility to meet the situation. For many years, starch was sold only in bags, and facilities were set up for handling only bags.

If there was call for bulk shipment, bags had to be carried from warehouse to some overhead position and emptied into a chute feeding into a box car. This was satisfactory for handling infrequent bulk-shipment orders, but sudden increase in these orders soon made facility inadequate.

Solution: When Staley made plans for a new starch dryer building (CHEMICAL PROCESSING, August 1957, page 46), they included facilities to handle increased bulk orders. Flexibility in storing, packing, and loading facilities was a prime

One man can pack 100-lb bags at rates to 600 per hour on automatic filling machine which fluidizes the starch for fast operation

Bulk starch is loaded in box car via automatic adjustable-elbow loader. Unit automatically adjusts itself to give even distribution of product throughout car

consideration in building the new plant.

Versatile construction of packing and loading facilities permits disposition of starch from storage bins in a number of ways.

Starch packed in paper bags is handled on two 2-tube automatic filling machines. These machines automatically weigh and fill valve-type 100-lb multiwall paper bags. Their principle of operation, which fluidizes the starch, permits high speed operation — up to 600 bags per hour. Only one man is needed to feed empty bags to a machine, tuck in sleeve valves, and drop filled bags onto a conveyor. (A semi-automatic packing machine is used to handle infrequent orders for starch in open-mouth bags.)

Bags then are conveyed either to storage location or directly to box car loading station. Bags to be loaded directly to box car come down chute onto a bag-loader running into car. This machine telescopes across gangplank into the car and does not have to be stopped until car is fully loaded. Equipped with a "quick-acting control", it allows one man to handle up to 20 bags per minute. Palletized bag shipments are handled from storage location.

Train shed, with capacity for spotting five cars, is integral part of building. Here,

Turn to next page

Important News
from VULCAN:
We are now making drums
Repeat: We are now making DRUMS
Repeat: We are now making **DRUMS**

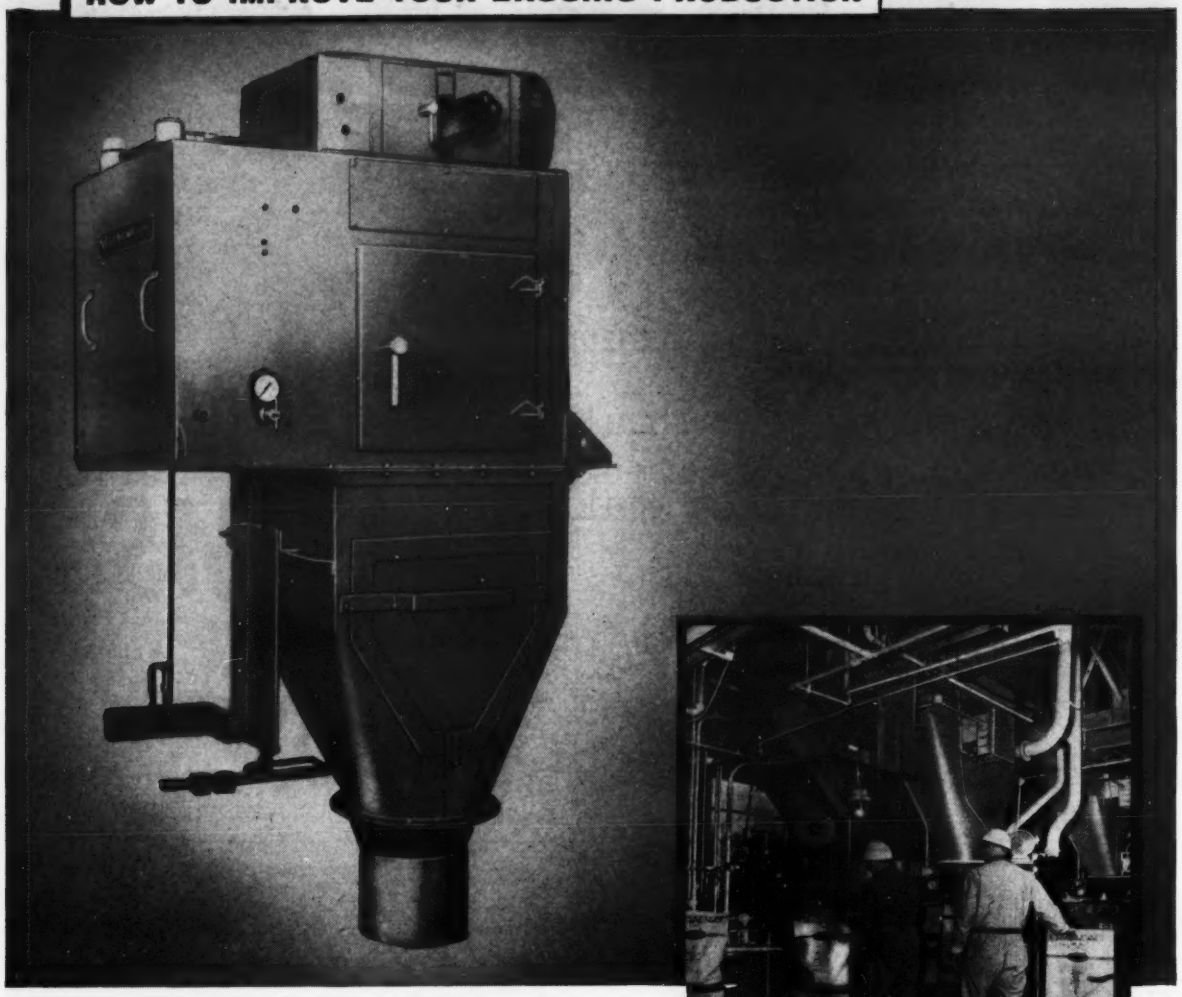
...in addition
to our complete line of
steel pails and
tin plate cans!
Call, wire or write
for complete information:

VULCAN CONTAINERS INC.
BELLWOOD, ILLINOIS

Chicago phone: MAnsfield 6-7660
Long Distance: LInden 4-5000

When inquiring check 5792 opposite last page

HOW TO IMPROVE YOUR BAGGING PRODUCTION



Richardson Bagging Scales

give faster speeds with closer accuracies

Efficient and reliable bagging scales are the answer to today's need for faster production and lower per unit cost. Richardson Scales meet these requirements. And you avoid inaccuracies of underweights and overweights even at high bagging speeds. With over 55 years of experience in materials handling by weight, Richardson produces the highest quality bagging scales to provide stepped-up operations at lowest over-all cost. Simplicity of design and sturdiness of construction assure long life and dependability.

Richardson Bagging Scales are available in many models for many types of materials handling in bagging ranges of 25-250 lbs. The E-50 illustrated is extremely versatile in bagging most types of materials at speeds up to twelve 100-lb. bags per minute and within an average accuracy of ± 1 to 2 oz. or better. Special scales for flour, sugar, rice, feed and chemicals are available. Low cost automatic proportioning systems and engineering service are Richardson specialties. Write today for details on Richardson Bagging Scales for the Food and Chemical Industries.

Richardson

MATERIALS HANDLING BY WEIGHT

4073

RICHARDSON SCALE COMPANY, CLIFTON, NEW JERSEY

Atlanta • Boston • Buffalo • Chicago • Cincinnati • Detroit • Houston • Memphis • Minneapolis
New York • Omaha • Philadelphia • Pittsburgh • San Francisco • Wichita • Montreal
Toronto • Havana • Mexico City • San Juan • Geneva, Switzerland • Nottingham, England

When inquiring check 5793 opposite last page

Shipping Flexibility

Starts on page 204

bagged starch can be loaded into box cars, or material for bulk shipment can be conveyed directly from bins to box or hopper cars.

For loading into any type of hopper car, starch passes into enclosed overhead conveyor feeding into mobile loading spout positioned as desired over the five spots.

Bulk starch to be loaded into box cars is handled by a conveyor-loader, consisting of a mechanical chute with adjustable elbows. Elbows adjust automatically to height of material in box car and permit even distribution of product throughout car.

Results: With new packing and loading facilities, Staley has gained flexibility and capacity to handle variety of shipments.

Considerable cost reductions in packing and loading operations have been realized through use of modern, automatic equipment. For example, the automatic filling machines require only one man, whereas five men were previously needed for a similar bagging operation.

(Automatic box car loader is manufactured by Manierre Engineering and Machinery Co., Dept. CP, 759 N. Milwaukee St., Milwaukee 2, Wis. . . . or for more information check 5794 on form opposite last page.)

("Fluopacker" filling machine is sold by St. Regis Paper Co., Dept. CP, 150 E. 42nd St., New York 17, N. Y. . . . or for more information check 5795 on form opposite last page.)

Adhesive additive info

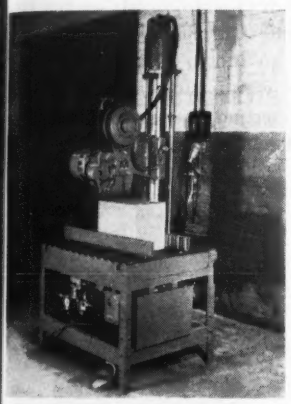
Comparative penetration evaluations, typical formulations, and new test procedures for tack development are featured in six-page bulletin on adhesive additives. Additives are for corrugating, laminating, tube winding, and bag seam adhesives. TI 303—Minerals & Chemicals Corp. of America, Dept. CP, Menlo Park, N. J. Check 5796.

Stitching machine closes tops and bottoms of filled boxes

Makes self-clinched stitches from flat stitching wire

Uses: Simultaneously closing tops and bottoms of filled boxes (regular or overlapping flaps), sides and ends of filled five-panel folders and two-piece telescope boxes as well as sides, ends, tops and bottoms of outsize containers.

Features: Circuate stitching method spans center seam of regular slotted boxes. This



Circuate stitching machine closes tops and bottoms of filled boxes

reduces number of stitches required and steps up rate of closure. Rates up to 700 average-size boxes stitched per hour are reported.

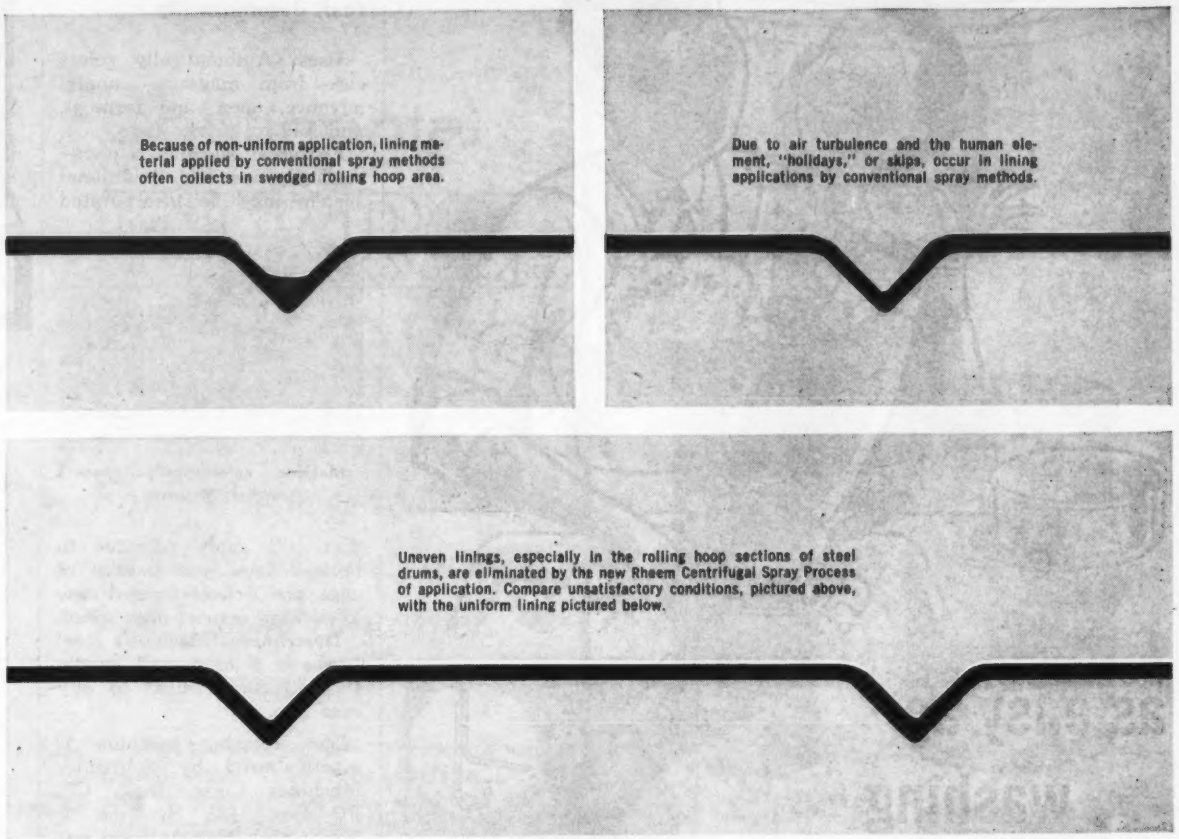
Description: Machine cuts and forms stitches from a continuous coil of wire. The stitches are driven into both outer and inner flaps of boxes and clinched inside inner flap without any mechanism entering the box.

Machine is easily integrated into conveyor-line packaging systems. Each stitching unit drives 290 stitches per minute.

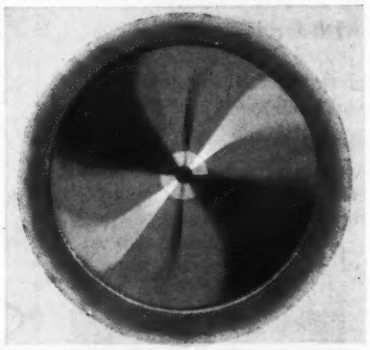
Operation is actuated by electric foot trip.

(Circuate wire stitching machine is manufactured by Acme Steel Co., Dept. CP, 135th and Perry Ave., Chicago 27, Ill. . . . or for more information reader may simply check 5797 on form which is located opposite last page.)

No more globs or skips!


Because of non-uniform application, lining material applied by conventional spray methods often collects in swedged rolling hoop area.
Due to air turbulence and the human element, "holidays," or skips, occur in lining applications by conventional spray methods.
Uneven linings, especially in the rolling hoop sections of steel drums, are eliminated by the new Rheem Centrifugal Spray Process of application. Compare unsatisfactory conditions, pictured above, with the uniform lining pictured below.

New Rheem Centrifugal Spray Process gives you a completely uniform lining, drum after drum after drum!



New Centrifugal Sprayer spins off a continuous curtain of finely atomized lining material at a controlled, uniform rate.

All surface areas of a drum automatically lined by the new Rheem Centrifugal Spray Process are—*and stay*—completely and uniformly coated.

This new, fully automatic process not only eliminates globs and skips but blisters and pinholes as well. And Centrifugal Spraying, teamed with the new Rheem Vertical Baking Process, results in a curing job never before equaled!

Only the new Rheem Centrifugal Spray Process gives you: (1) Uniform lining thickness—controlled to within .1 of a mil. (2) Uniform viscosity of lining materials with lower solvent content. (3) Uniform application. There's no air turbulence because there's no air used in the spray and no drum rotation. Spray always travels the same distance to coat all surfaces. Human element eliminated. (4) Uniform curing—thanks to vertical, 3-stage ovens with controlled air flow and temperatures.

In Rheem Baking Ovens, evenly heated air flows vertically through lined drums for uniform curing.

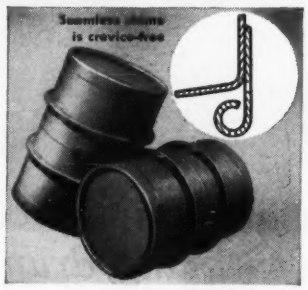
YOU CAN RELY ON Rheem WORLD'S LARGEST MAKER OF STEEL SHIPPING CONTAINERS

For full details write: Rheem Manufacturing Co.
Container Division, 1701 Edgar Road, Linden, N. J.

Plants and Sales Offices: Richmond and South Gate, Calif. • Chicago • Linden, N.J. • New York • Houston • New Orleans • Sparrows Pt., Md.

When inquiring check 5798 opposite last page

as easy as washing seamless pans



Seamless chimes of Hackney two-piece acid drums harbor no acid traces between shipments

Here's one reason why so many leading sulphuric acid producers ship in Hackney Acid Drums. Hackney two-piece acid drums are made with entirely *seamless chimes.* They have no interior cracks or crevices where acid traces can linger and carry on intensive corrosion between shipments. Controlled heat treatment further increases corrosion resistance of selected, top-quality steel. Meet ICC specifications for the safe transportation of corrosive liquids such as sulphuric acid, aqua ammonia, titanium tetrachloride, caustic potash and many others.

Rugged and Durable—Take shipping and handling abuses on the chin thanks to such construction features as reinforced chimes, sturdy I-bar rolling hoops, heavy forged spuds. Standard capacities of 15, 20, 30, 55 or 110 gallons. Send today for Drum and Barrel Catalog and minimum quantity data.

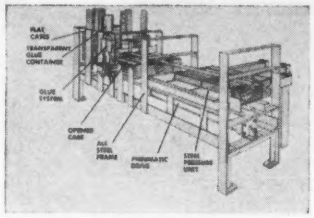
Pressed Steel Tank Company
Manufacturer of Hackney Products
1463 South 66th Street, Milwaukee 14, Wisconsin
Branch offices in principal cities
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

When inquiring check 5799 opposite last page

Opens and forms cases fast, automatically

Uses: Automatically select case from magazine supply, advance, open, and form it, and fold in bottom flaps.

Features: Machine is pneumatically operated. Additional system may be incorporated



Machine automatically opens and forms cases

that will apply adhesive to bottom flaps, seal bottom of case, and deliver formed case to packing area at high speed.

Description: Machine's steel frame is 9′ in overall length. It is "custom built" to any case size.

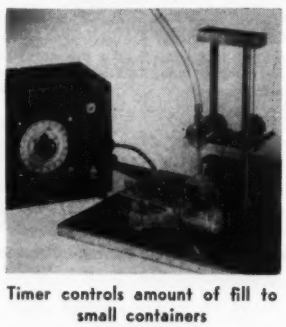
(Case forming machine is manufactured by Schroeder Machines Corp., Dept. CP, PO Box 1123, Syracuse 1, N.Y. Check 5800 on form opposite last page.)

Can be placed anywhere to fill small bottles with liquids

Amount of fill is controlled by adjustable timer

Uses: Filling small bottles, cans, and polyethylene bottles with controlled amount of liquid.

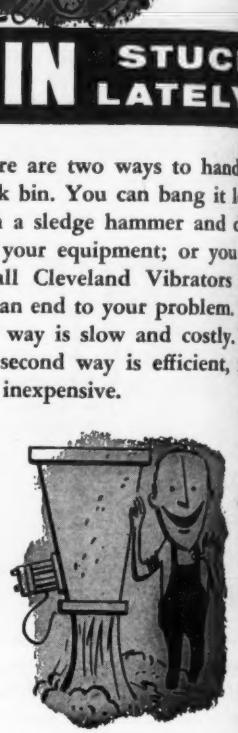
Features: Taking two sq ft of table space, machine sets



Timer controls amount of fill to small containers

BIN STUCK LATELY?

There are two ways to handle a stuck bin. You can bang it loose with a sledge hammer and damage your equipment; or you can install Cleveland Vibrators and put an end to your problem. The first way is slow and costly. But the second way is efficient, fast, and inexpensive.



How about you! Are your schedules suffering from stuck bins? The low cost of Cleveland Vibrators will surprise you, and the results will definitely please you. Why not get the whole story with a two-cent post card.

Air or Electric
Portable or Permanent
Silent or Standard

2708 Clinton Avenue • Cleveland 13, Ohio

When inquiring check 5801 opposite last page

up easily in a few minutes and is adjustable to any shape container with almost any size opening. Basic unit is adaptable to single or multiple filling. It may be utilized as a proportioner to deliver same amount of fill or different amounts of fill into same container.

Description: When container is placed under filling head, it closes switch which opens valve and starts timer. At end of preset time interval, valve closes and flow stops.

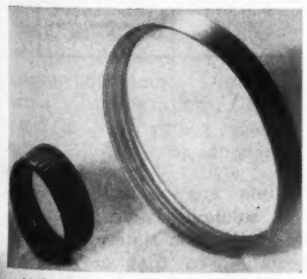
Timer is adjustable to 1/60th of a second, and its motor is independent of line voltage. Feed is either by gravity or pressure.

(Filling machine for small containers is manufactured by North American Electric Corp., Dept. CP, 1713 S. Halsted St., Chicago 8, Ill. Check 5802 opposite last page.)

Hidden-thread caps for bottles, jars are aluminum

One-piece cap will not crack or break

Single-piece bottle or jar caps made of aluminum have hidden-thread design. Produced in two sizes, for narrow- or wide-mouth bottles and jars, the caps will not crack or break.



Hidden-thread caps for bottles and jars are made of aluminum

Caps are available in metallic and regular colors.

(Hidden-thread closures are manufactured by Aluminum Co. of America, Dept. CP, 1501 Alcoa Bldg., Pittsburgh 19, Pa. Check 5803.)

Continental

FIBRE DRUMS

For variety, versatility, and value, the finest shipping container available

When you pack your products you ask one basic question . . . will they be safe in shipping or storage? The answer to that all-important question is always yes, if you pack your product in one of the many fine Continental Fibre Drums.

Continental containers are tailor-made to meet the specific needs of your products. You have the widest choice of size, style, and design, plus the assurance of a fibre drum with exceptional durability. A real top-quality container. And you get real value, too, because the light weight of these fibre drums cuts down on freight costs.

So get all the advantages offered to you in Continental Fibre Drums . . . Leverpak, Stapak, or Fiberpak. You always get the finest from Continental.

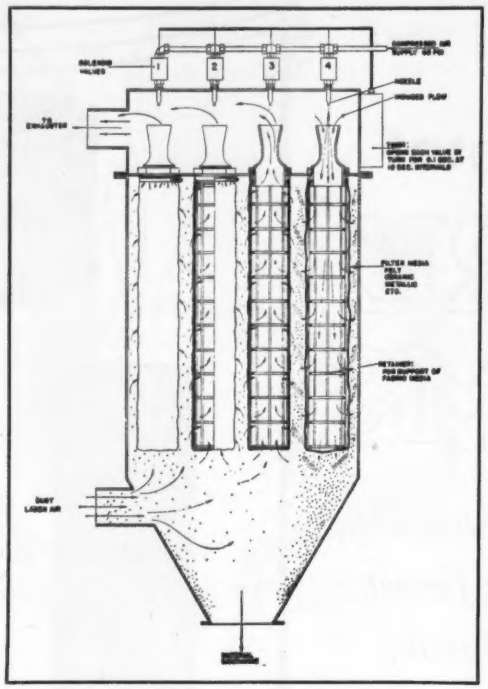
TAILOR-MADE PACKAGE SERVICE

CONTINENTAL CAN COMPANY

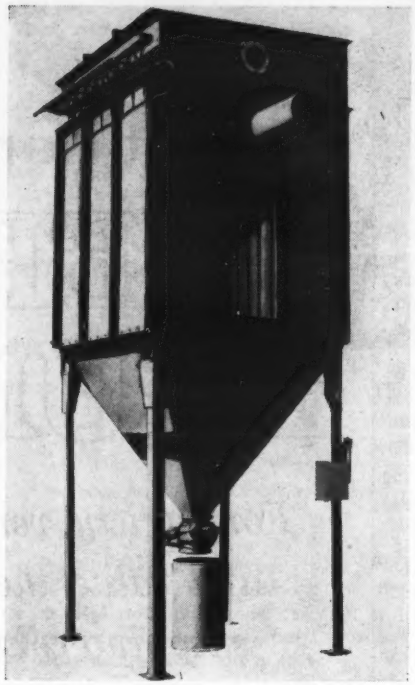
FIBRE DRUM & CORRUGATED BOX DIVISION, NEW YORK, N. Y.

Van Wert • Philadelphia • Pittsburgh • Tonawanda • Cleveland • Chicago • Atlanta • St. Louis • San Francisco • Los Angeles • Eau Claire • Boston

When inquiring check 5804 opposite last page



Cleaning is accomplished by introducing jet of air through venturi mounted above each filter element



Collector (left) consists of group of cylindrical filter elements enclosed in dust-tight housing. Filter compartment door has been removed to show bags in this 48-tube unit

Comparison chart (below) between new collector and conventional fabric-type units

MIKRO-PULSAIRE	FEATURES	CONVENTIONAL TYPE
99.9+%	EFFICIENCY	97 to 99.9%
5 to 15	FILTER RATE (CFM per sq. ft.)	1 to 15
High Up to 1000	GRAIN LOADING (Grains per cu. ft.)	Low Usually 15 max.
3 to 6 inches WG.	PRESSURE DROP	3 to 6 inches WG.
Up to 390°F., possibly higher through use of Porous Ceramic or Metal Filter Elements	TEMPERATURE	Limited to about 250°F. for practical applications
Woven or Felted Fabrics plus Porous Metal and Ceramics	FILTER MEDIA	Limited to Woven or Felted Fabrics
NONE—No Internal Moving Parts	INTERNAL MECHANISM	Shaking mechanism, chains, sprockets, blow-rings, indexing mechanisms, bearings, etc.
Replace bags as needed. Life of bags, switch and valves, long. Experience, so far, indicates maintenance to be practically nil.	MAINTENANCE	Replace bags as needed. Lubricate blow-ring, indexing or shaking mechanisms. Replace bearings, chain, sprockets and hose periodically depending on severity of job.
A spare valve, a spare relay and spare bags are all that are required.	SPARE PARTS REQUIRED	Many. Spare bags, hose, bearings, hose clamps, chain, sprockets, etc.

Operating on jet-action principle of continuous cleaning, new-type collector . . .

has no moving parts, gives over 99.9% dust collecting efficiency

Uses: Filtering and cleaning dust-laden air and gas streams continuously in chemical, food and allied industries.

Features: Dust collector has no internal moving parts, making maintenance almost nil. Dust collecting efficiencies of over 99.9% have been recorded in tests and field performance. Unit requires no lubrication except for auxiliary equipment.

Description: Collector units consist of a varied number of cylindrical filter elements enclosed in a dust-tight housing. Elements are either 4 or 6 ft long, with 4½ in diameters.

Dust-laden air is admitted to housing through side inlet. Clean air is withdrawn from inside of filter elements by means of an air circulating system. Major portion of dust goes directly from inlet down to bottom discharge of collector housing. Balance of dust is retained on outside surfaces of filter elements.

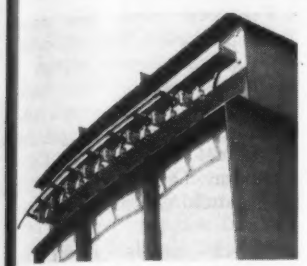
Filter elements are cleaned by momentarily (about 1/6 sec) introducing a jet of 60 psi air through specially contoured venturi mounted above each filter cylinder (see drawing) This primary high pressure air pumps additional secondary air via the jet pump process, thus producing a reverse flow sufficient to clean the dust material clinging to outside surfaces of filter cylinders. Air requirements are about 1 to 2 cfm.

Since only a single filter tube is cleaned at a time, continuous flow through collector is maintained. Jets are controlled by series of solenoid valves, actuated by an electric timer. Timer is adjustable, so that cleaning cycle can be varied to meet load conditions.

A range of filter media is available including felt, ceramic, metallic, etc. When filter bags are used as the filter elements, greatly increased bag life has been experienced. In one field test, collector operated 3000 hrs without single failure. Bag life previously (with conventional fabric-type

collector) averaged only 10 days. Unit was operated on ground gypsum dust.

Because of absence of internal moving parts, collector can handle wide range of



Jets are controlled by series of solenoid valves, actuated by an electric timer

materials, including abrasive products. Design permits dust loading up to 1000 grains per cu ft.

Toxic or hazardous dusts can be handled with minimum purging and hazard. Operating temperatures up to 390°F are possible. Air flow through collector is constant and there is uniform pressure drop across unit at all times. Collectors require less space than conventional units of same capacity. Units are available with 9, 20, 30, and 48 filter tubes.

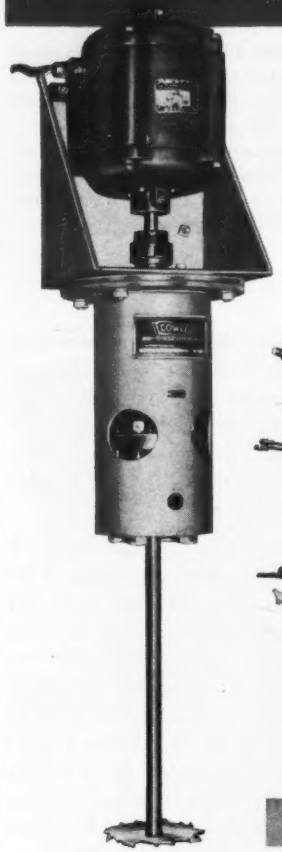
Capacities range from 400 and 600 cfm dust-laden air in smaller units, to 3350 and 5000 cfm for the 48-tube unit. Collectors can also be assembled in multiples to permit handling of larger air volumes.

(Mikro-Pulsaire dust collector was developed by Pulverizing Machinery Division, Metals Disintegrating Company, Inc., Chatham Road, Summit, N. J. . . . or for more information check 5805 on form opposite last page.)

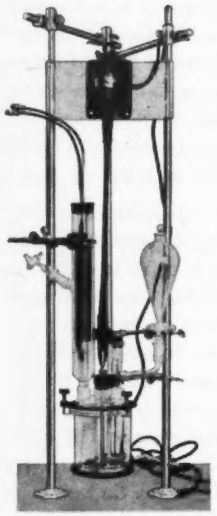
Data on water filters

Data on manufacturer's filters for water and aqueous liquids are presented in four-page bulletin. Information on filtering capacity, operating pressures, and sizes is included. Bul GEO-501 — Commercial Filters Corp., Dept. CP, 2 Main St., Melrose 76, Mass. Check 5806.

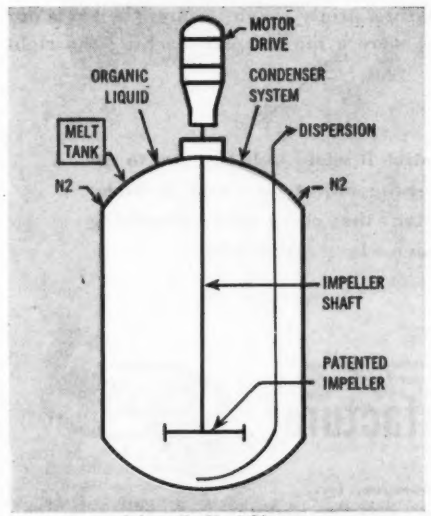
New Cowles Dissolvers Can Help You Solve Metallic Dispersion and Reaction Problems



Cowles Pilot-Plant Sodium Dispersion Dissolver



Cowles Laboratory Sodium Dispersion Dissolver



Schematic Plant Diagram

Big volume sodium and lithium dispersions finished in 30 minutes or less, particle size as small as 2 microns, with plant-proven Cowles equipment.

Highest quality metallic dispersions can now be easily controlled and produced in big volume, making many reactions commercially practical for the first time.

Key to the new method is the unique action of the patented Cowles impeller. With rim speeds of up to 6150 fpm, the impeller vanes create a zone of intense turbulence and hydraulic shear. The liquid is moved rapidly through itself until maximum dispersion is obtained. The Cowles thus gives several many very important advantages:

Versatility — prepares material for many reactions under conditions not heretofore possible.

Finer particle size — gives maximum reaction surface to dispersed elements.

More complete dispersion — assures complete homogeneity of material.

Greater speed — cuts finished dispersion time substantially.

Cleanliness — self-cleaning impeller will not clog with metal.

Safety — gives the close control necessary with highly active materials.

Predictable results — laboratory and pilot-plant models provide results easily duplicated in larger models.

New Cowles Dissolvers with properly sealed and specially designed drives for metallic dispersions are available for all purposes. Included are "package" models in both laboratory and pilot plant types, and models for commercial production. All are thoroughly proven in actual plant operations and represent the broad experience and know-how of our organization – the established leader in its field. Specialized engineering assistance can be supplied if desired.

For complete information write today for Technical Bulletin No. 21-1957, "Metallic Dispersions with the Cowles Dissolver."

Additional Cowles Dissolver models are available for efficient processing of all solid-liquid, liquid-liquid and gas-liquid products.

Take advantage of the unusual *Morehouse-Cowles Processing Equipment Application Service* at no obligation – for a comprehensive survey of your plant requirements and end products, with laboratory assistance and in-plant tests at our risk.

MOREHOUSE® COWLES

MOREHOUSE-COWLES, INC.
1150 San Fernando Road, Los Angeles 65, California
Distributors in Principal Cities
Convenient lease and time-payment plans

5702

When inquiring check 5807 opposite last page

What good is specialized business publication advertising?

Frank Kistenberger
Metallizing Engineering Co., Inc.

Sells industry

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front . . . the men the ads are supposed to help . . . the men who sell.

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized market to which he sells:

Says Mr. Kistenberger:

"I happen to know that better than 50% of my sales to new companies can be traced to leads from our business paper advertising. Another 25% of my sales to new owners I close after following up leads that can't be traced directly to our advertising, but I know darn well that that's where they come from because that's about the only place they could learn about our metallizing systems.

"It's been my experience that our trade advertising is getting to the right people. In many cases this man is an executive who is hard to see on a cold call. But he's a guy that will take the time and trouble to read and he's just the one to drum up interest in metallizing down the line in his company. In other words, you get more action if the suggestion comes down to the production department or the plant engineer from this executive. Of course, I don't mean to say that people will just read about a product like ours and instruct someone to write out an order. It's not that simple. But they do know about metallizing from our advertising and sometimes a surprising amount. That was particularly true of our new ceramic spraying equipment which was introduced last year and which got us into fields we'd never been in before. I think that getting a new product known is usually a pretty tough job but the leads our advertising got us were a big help in reaching the right people."

Why not ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives – and to make sure the publications that carry your advertising are read by the men who must be sold.

The Manufacturer

NBP

One of the 207 members of National Business Publications, Inc. ...each of which serves a specialized market in a specific industry, trade or profession.

Mobile ribbon mixer has quick-opening dust-tight cover

Uses: For mixing dry, free-flowing powders or granular materials.

Features: Unit has dust-tight, gasketed, hinged, cover with quick-opening clamps.

Description: Mobile, horizontal, ribbon mixer is available in working capacities from 0.34 to 20 cu ft. Construction can be of carbon steel, stainless steel, or Monel metal.

Mixer moves freely on heavy-duty casters. Single or double-ribbon, or ribbon and paddle agitators are furnished. Discharge is made either from center or end by slide gate or worm-gear-operated plug gate. Unit includes motor and drive.

(Mobile ribbon mixer is product of The Young Machinery Co., Dept. CP, Muncy, Pa. ... or for more information check 5808 on Reader Service slip opposite last page.)

Sticky coatings blended with minimum downtime in rotary blender

Company cuts cleanout time to almost nothing

Mixing dry materials with a liquid colloidal binding agent can be a time-consuming and expensive operation when excessive downtime for clean-outs is required. Problem is so serious that some firms purchase two blenders for mixing such sticky materials. One unit blends while the other is down for cleaning.

Bird & Son, Inc., East Walpole, Mass., manufacturers of asphalt roofing, floor coverings, and other products, have learned through experience how to cut downtime to almost nothing. They have been using the same 7' diam rotary batch blender for 16 years to blend rock granules, pigments, and a sodium silicate to produce a coating for roofing products.

Here are some of the preventive controls that company

has put into use: In blending, the rock granules tend to stick to the flights of the blender's interior and cake. To partially control this, company developed a mix that leaves the colored granules no wetter than damp sand, limiting their adhesiveness.

A second control is in rinsing out the unit with water and uncoated granules at end of each shift. The granules enter through a hopper, water through a pipe. The abrasive action of the granules loosens most coated granules that accumulate. In the minutes that it takes, this prevents a serious downtime problem. This step is taken when a different pigment is to be blended.

The interior design of the drum itself minimizes "shelves" and "ledges." Self-discharging, it is entirely self-cleaning with ordinary dry materials.

Granules that aren't washed out in the above fashion are chipped out once a month or so, on a Saturday when mill is not operating.

(Rotary batch blender was produced by Sturtevant Mill Co., Dept. CP, 119 Clayton St., Boston 22, Mass. Check 5809 opposite last page.)

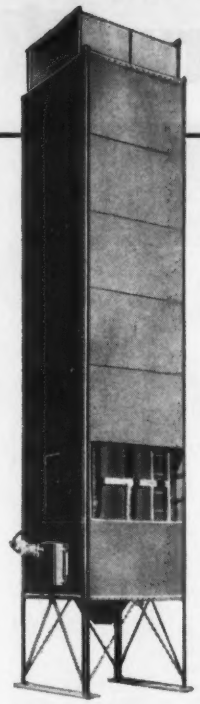
Separator data

Design, construction, and performance information on manufacturer's entrainment separator is presented in 20-page bulletin. Bul 111 — Schuyler Mfg. Corp., Dept. CP, North Arlington, N.J. Check 5810.

The latest advancement in dust recovery

Dualaire*

REVERSE-JET DUST COLLECTOR!



- *Cleans without jarring or rapping!*
- *Maintains uniformly low pressure drop!*
- *Field-proven efficiency as high as 99.99%!*

Backed by the same organization that pioneered commercial application of COTTRELL Precipitators and MULTICLONE Collectors, the DUALAIRE Reverse-Jet Dust Collector is revolutionizing filter-type recovery systems. The DUALAIRE gives you vital advantages like these . . .

REVERSE-JET CLEANING ACTION cleans the filter tube continuously in small increments—not with sudden surges as in rapping or jarring.

CLEANING ACTION starts automatically and stops automatically to keep pressure differential within low pre-set range.

FILTER EFFICIENCY remains uniformly high at all times because no thick filter cake ever forms to reduce operation effectiveness. Actual field tests show efficiencies as high as 99.99%!

NO STANDBY UNITS, with their complicated switching devices, are needed. The DUALAIRE is cleaned as it filters—without interruptions or shut down periods for cleaning. The operation is continuous!

FILTER UNITS LAST LONGER because they are not subjected to intermittent jarring, rapping or vibration—all destructive to filter fabrics.

The above are only a few of the many important advantages you get in DUALAIRE Dust Collectors. A new 8 page booklet gives the full story . . . explains how reverse-jet cleaning action works — provides facts, figures and illustrations that will change your thinking on filter-type recovery systems. Send for your free copy of this descriptive booklet — or see your nearest Western Precipitation representative!

WP

COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
CMP Combination Units
DUALAIRE Reverse-Jet Filters
HOLO-FLITE Processors
HI-TURBIANT Heaters

WESTERN PRECIPITATION CORPORATION

Engineers and Constructors of Equipment for Collection of Suspended Material from Gases . . . and Equipment for the Process Industries

LOS ANGELES 54 • NEW YORK 17 • CHICAGO 2 • PITTSBURGH 22 • ATLANTA 5 • SAN FRANCISCO 4

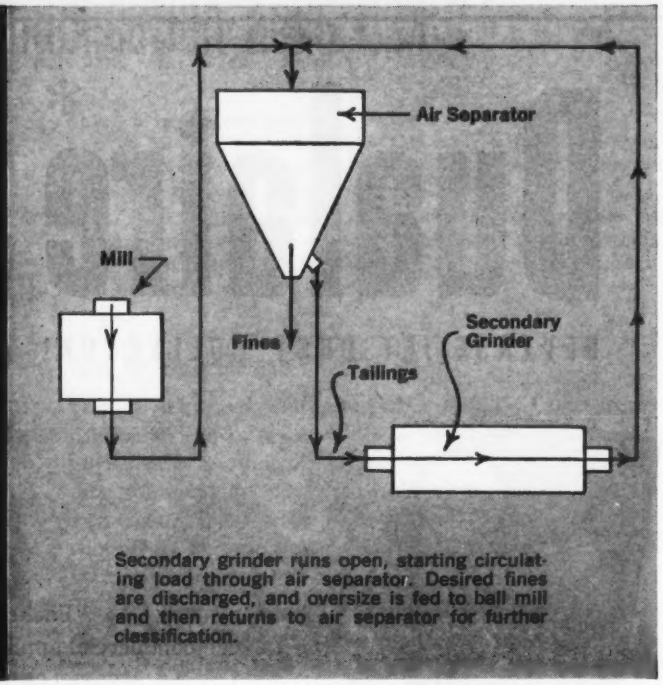
Representatives in all principal cities

Precipitation Company of Canada Ltd., Dominion Square Bldg., Montreal

When inquiring check 5811 opposite last page

Stop Overworking Grinding Mills

FEED SPOUT
Sturtevant Air Separators come in 9 models, diameters range from 3 to 18 ft.
TAILINGS DISCHARGE
FINES DISCHARGE



Secondary grinder runs open, starting circulating load through air separator. Desired fines are discharged, and oversize is fed to ball mill and then returns to air separator for further classification.

LET STURTEVANT AIR SEPARATION HELP YOUR SYSTEM PRODUCE UP TO 300% MORE 40 TO 400 MESH FINES — CUT POWER COSTS AS MUCH AS 50%

Fines that pass through grinding mills unhindered, serving only to increase the work load, can be quickly classified by a Sturtevant Air Separator operating in closed circuit. With all oversize automatically returned for further grinding, the result is production capacity impossible to achieve in single-pass grinding — as well as a better, more uniform product.

Closed circuit grinding and air separation is of proved advantage in *all* secondary reduction processes. Grinding mills are free to perform at top efficiency, their output frequently increased as much as 300% and power costs cut up to 50% (documented by 30 years of Sturtevant air separation experience in the cement industry). Further, attritional heat is dissipated by greater surface exposure.

Current users of Sturtevant Air Separators include manufacturers of sulfur, soybeans, phosphate, chocolate, feldspar, sand, pigments, limestone fillers, abrasives, plasters, ceramics and cement.

Designed for precise separation of all granular materials, Sturtevant Air Separators have been adapted to other materials as well. Johns Manville, for example, uses a 10 ft. model to separate 3 to 6% undesirable rock from asbestos.

Ruggedly constructed, Sturtevant units are designed for minimum maintenance — at a Midwestern rock-crushing plant, a 10 ft. Separator operates outdoors year-round with only routine care.

For further information, request Sturtevant Bulletin No. 087. Write Sturtevant Mill Co., 119 Clayton St., Boston 22, Mass.

Sturtevant Air Separators Keep Grinding Units At Peak Efficiency — Classify Feed Loads to 800 Tons Per Hour

Sturtevant Air Separators circulate production loads with exact control of air currents and centrifugal force. Simple adjustments make possible counter-action between the two to the point where a product of almost any desired fineness may be collected while coarser sizes are rejected.

A 16 ft. Sturtevant, for example, took a feed rate of 800 tph, containing only a small percentage of desired fines, and delivered 30 tph 90% 200 mesh, recirculating the oversize through the grinding circuit. (In the cement industry, Sturtevant units deliver up to 60 tph raw cement fines, 40 tph finished cement fines.)

Sturtevant's ability to engineer precise, high capacity classification for closed circuit grinding systems is the result of long experience with a wide variety of dry processes. Sturtevant designed its first air separator some 40 years ago — and has been pioneering developments in centrifugal classification ever since.

STURTEVANT

Dry Processing Equipment

CRUSHERS • GRINDERS • MICRON-GRINDERS
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When inquiring check 5812 opposite last page

High tension separation

Comparison of electrostatic with high tension or electrodynamic separation is contained in four-page bulletin. Minerals that can be separated by high tension units are listed. Plant flowsheet for high tension separation is shown. Bul HTB-103 — Carpco Mfg., Inc., Dept. CP, PO Box 3272, Jacksonville, Fla. Check 5813.

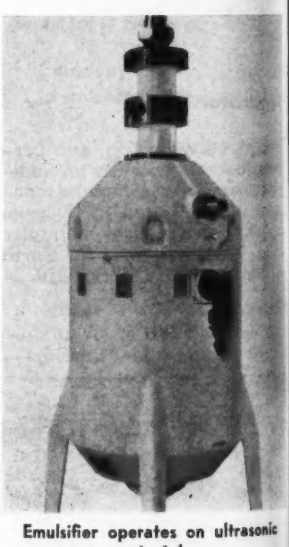
Ultrasonic emulsifier designed to handle abrasives

Energy is developed and used right in liquids

Uses: Dispersing powders in liquids or emulsions of an abrasive nature.

Features: Machine operates on ultrasonic principle and uses the fluid-dynamic force of the liquid itself to produce sound waves.

Description: Ultrasonic energy is accomplished by impinging the liquids to be emulsified in a jet stream on the edge of a blade. Blade vibrates at its natural frequency (about 22,000 cps). Cavitation occurs continuously in the stream rushing past the blade. All energy is developed and used right in the liquids.



Emulsifier operates on ultrasonic principle

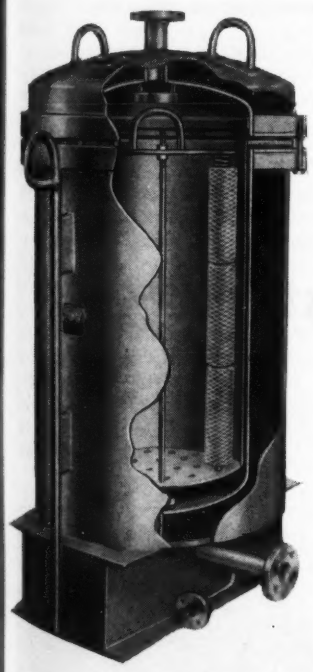
Primary components are

continuous cavity pump and ultrasonic head driven by 3-hp motor. Motor provides for continuous output of 300 gph. Mounted edgewise on legs, unit is easily set into place and moved as demands change.

(Dispersonic ultrasonic emulsifier is product of Sonic Engineering Corporation, Dept. CP, 146 Selleck St., Stamford, Conn. . . . or check 5814 opposite last page.)

Lead-shielded filter weighs 5-tons

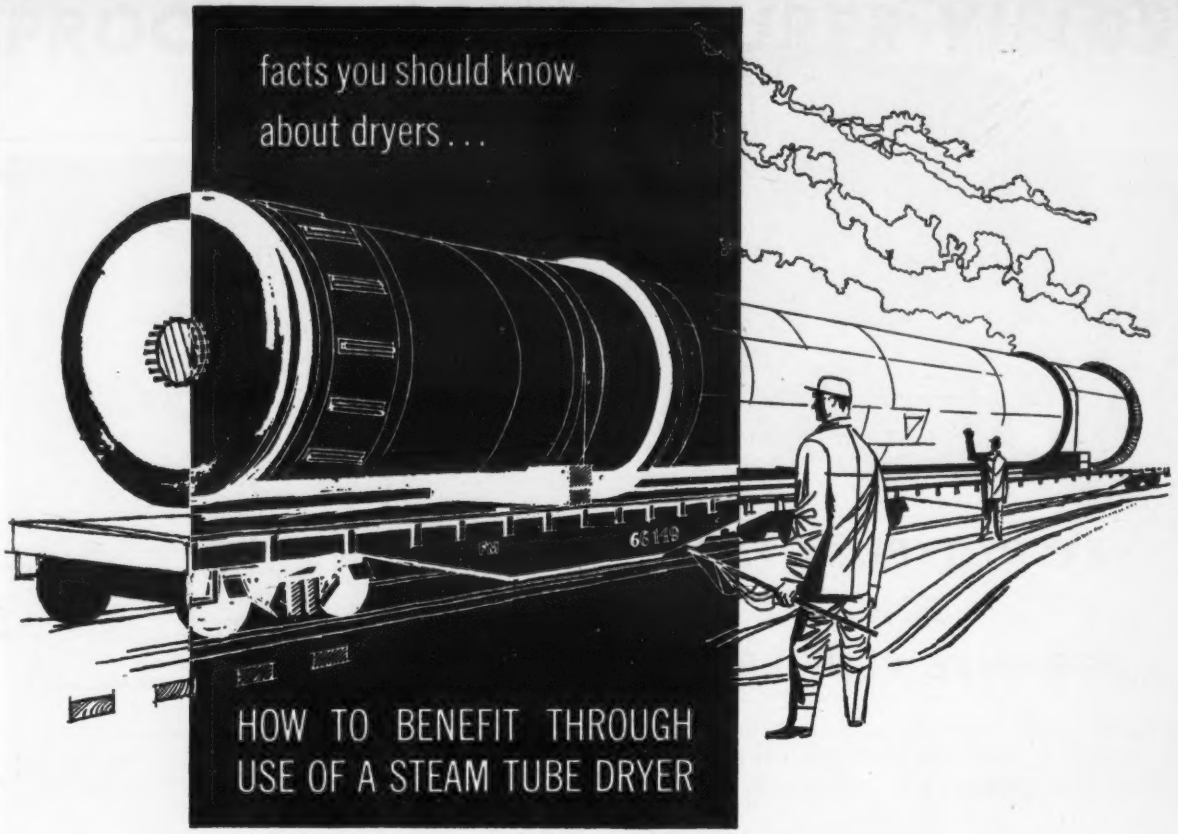
Special lead-shielded filter provides microscopic clarity of radioactive liquids without danger from harmful radiation. Only four feet high, filter weighs over five tons. Extreme weight is due to



Filter, weighing over five tons, has void-free lead shielding

four-inch-thick void-free lead shielding surrounding filtering chamber and cover. Shield lets container be decontaminated and used indefinitely.

(Lead-shielded filter is product of Commercial Filters Corp., Dept. CP, Melrose, Mass. Check 5815.)



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. This experience can often be applied to provide unusual benefits in specific cases, possibly yours, for example . . .

Q. *Since avoiding dust loss and contamination by furnace gases indicates the choice of an indirect heat rotary dryer for my material, what type of indirect dryer would you recommend?*

A. Unless there are abnormal conditions, *we would recommend a steam tube dryer,* especially if the material is heat sensitive.

Q. What advantages does the steam tube dryer offer *in comparison with indirect fire types?*

A. There are many advantages. One is ease of operation and low maintenance costs due to the definite moderate temperature (established by steam pressure) imposed on both the material being dried and on the dryer itself. Another advantage is that there is no furnace refractory maintenance. Still another advantage is quick "warm up" and "cool off". In many cases where the drying operation is intermittent, there is no need to shut off the steam supply or stop rotation when the wet material feed is interrupted since steam is condensed in quantity only when wet material is fed.

Q. *Isn't steam supposed to be an expensive drying medium?*

A. That depends on how the steam is used. It is true that a low overall efficiency results (often as low as 25%) when steam is used to heat air for low temperature drying. However, the Louisville Steam Tube Dryer normally utilizes 85% or more of the available heat in the steam. By combining this with a reasonable minimum efficiency of 80% in modern small steam generators (and higher in large boiler plants), you get an overall efficiency close to 70%. This compares with indirect fire dryers which develop an efficiency seldom higher than 50% and generally less.

Q. *Does material insulate the tubes by sticking to them or by clogging the spaces between tubes?*

A. Very few materials have this tendency to any serious extent and most of these, when properly conditioned before feeding, handle without difficulty. For the balance, no dryer using heated surfaces for heating the material is a proper application.

Q. *How can I be sure a Steam Tube Dryer will handle and dry my material satisfactorily?*

A. The General American dryer pilot plant is at your service. No charge for routine tests and demonstrations. No obligation, either. Write for test date.

PROCESS EQUIPMENT DIVISION GENERAL AMERICAN TRADE MARK

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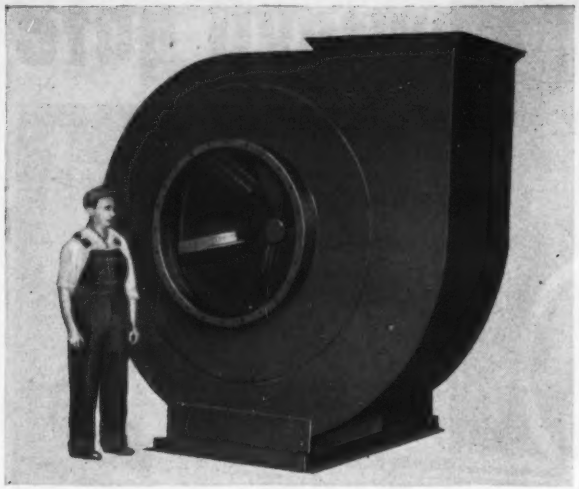
In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada
General Offices: 135 S. La Salle Street, Chicago 90, Illinois

When inquiring check 5816 opposite last page



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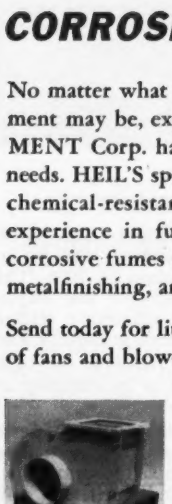
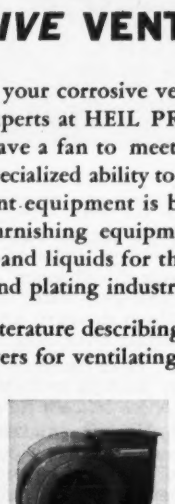
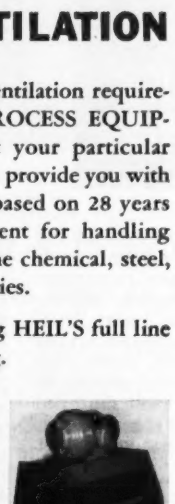
Send today for literature describing HEIL'S full line of fans and blowers for ventilating.



No. 6 COATED CENTRIFUGAL FAN



SOLID PLASTIC CENTRIFUGAL FAN 500 CFM—12,000 CFM



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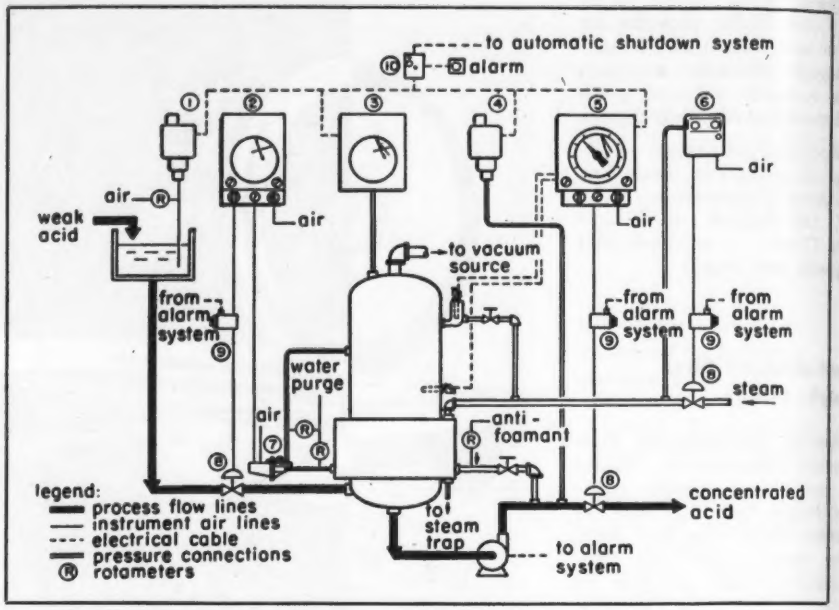


Control system installed on manually-operated evaporator has changed unit into a fully automatic, continuous device

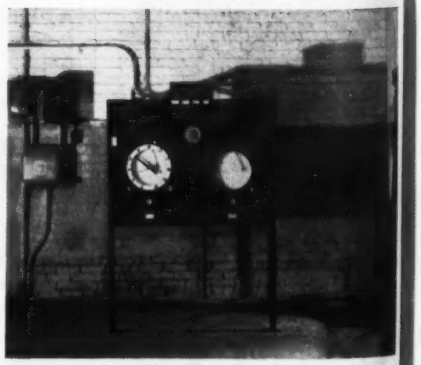
Boiling-point-rise control system installed on old batch-type evaporator at Stauffer makes unit continuous and automatic, boosts production, and . . .

cuts operating costs 90%

GEORGE WEBER,
Plant Manager, Brooklyn Plant
Stauffer Chemical Company

Problem: Excessive operating costs were being experienced with veteran, batch-type, single-effect evaporator at Stauffer Chemical Company, Brooklyn, New York. Used to concentrate tartaric acid, the unit had given faithful service for years, but it required considerable downtime and maintenance to keep going. Overall economics of the operation showed that something had to be done fast, or company would be using red ink in the evaporator account.

Solution: After considering various courses of action, engineers decided that the best (and most economical) way would be to "rejuvenate" the evaporator — change it from a manually controlled batch operation to one that is automatic, continuous, and efficient.



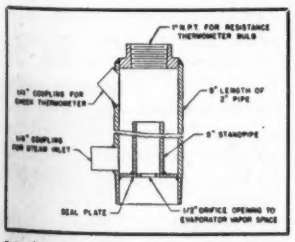
Control panel for evaporator. Unit operates completely unattended except during startup

Key to the solution would be a highly efficient b.p.r. (boiling-point-rise) control system used in conjunction with an ingeniously designed reference chamber. The control instrument is an electronic device actuated by two differentially connected resistance thermometer bulbs. One bulb measures temperature of the boiling liquor in the evaporator. The other measures the temperature of the boiling solvent at the evaporator pressure (this is called the reference temperature).

Since the bulbs are differentially connected, the instrument measures the difference between the two temperatures; that is the boiling point rise, which is a function of product concentration and therefore a successful basis for control.

Simple as it is in theory, the application of b.p.r. control to single-effect evaporators has been held back by two significant factors . . . both of which were overcome at the Brooklyn installation.

The first difficulty concerns the reference temperature. Most existing b.p.r. installations use a barometric leg to establish an accurate reference temperature. This does a fine job in every respect but one; it's expensive to build and install because it must be about 35 ft tall. Furthermore, it's very nearly impossible to use on a single-effect evaporator. Most of these units stand 15 to 25 ft tall — there just isn't enough room.

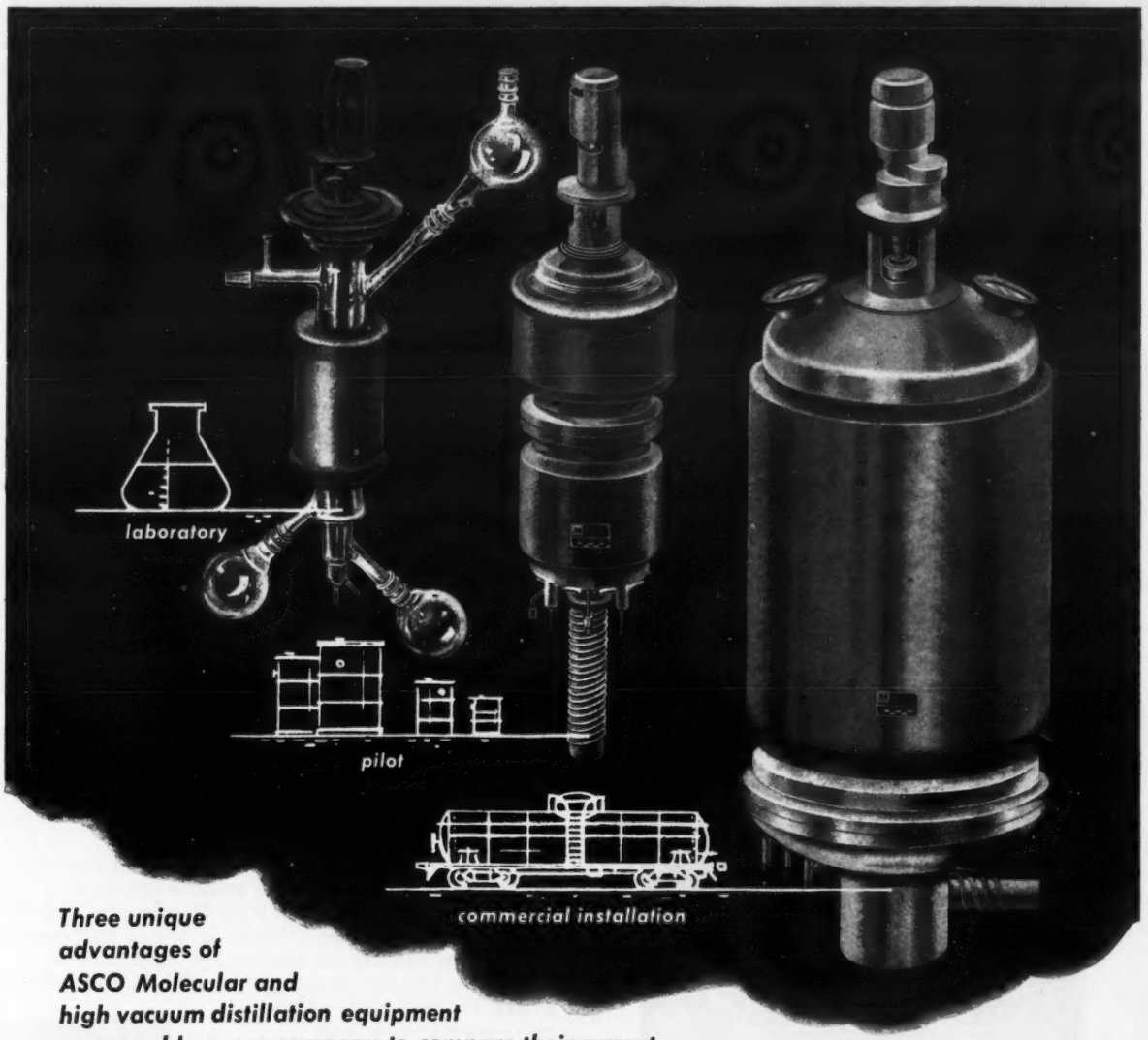

1" N.P.T. FOR RESISTANCE THERMOMETER BULB
1/4" COUPLING FOR RESIS. THERMOMETER
9" LENGTH OF 3" PIPE
1/4" COUPLING FOR STEAM INLET
9" STANDPIPE
SEAL PLATE
1/2" ORIFICE OPENING TO EVAPORATOR VAPOR SPACE

9-inch reference chamber replaces 35-foot barometric leg

Engineers solved this problem with a 9-inch reference chamber mounted on a port to the evaporator vapor space.

Turn to next page

PROCESS HIGHER, PURER YIELDS AT FAR LOWER COST



Three unique advantages of ASCO Molecular and high vacuum distillation equipment now enable every company to compare their current processing costs against the economical use of ASCO molecular stills.

First, *exclusive* Rota-Film pre-heating-degassing insures shorter exposure time in distillation, preventing destruction of valuable raw materials.

Second, *exclusive* Rota-Film wiped wall distillation gives higher yields, purer yields at lower cost per process unit. Third, Rota-Film Distillation Equipment is operated with existing personnel . . . at extremely low maintenance costs.

With no high speed centrifugal or moving parts, replacement costs are kept at a minimum, along with thermal and safety hazards. Operating conditions with ASCO equipment are normally milder than with other types of processing equipment, since it is less expensive to increase the vacuum than to heat process materials to a higher temperature.

Installations now in operation report processing costs of less than ½ cent per pound, enabling greater profits to be realized in the span of chemical markets from inexpensive wax recovery to costly tranquilizing drugs.

Test results obtained on the ASCO 50 Laboratory Still may be scaled up to production sizes directly, since 50 square inches of evaporative surface on the laboratory unit will demonstrate the results obtainable on the ASCO 4.8 square feet pilot model and the ASCO 50 square feet industrial model. The ASCO 50 Rota-Film Still is just $391. A 16-page bulletin is available describing the large units. Write Dept. CP-9.

asco ARTHUR F. SMITH COMPANY · 311 ALEXANDER ST. · ROCHESTER 4, N. Y.

When inquiring check 5818 opposite last page

Boiling-Point Control

Starts on page 216

Here's how it works: Low pressure steam, at 5 to 20 psig, enters chamber at steam inlet (see drawing). Steam flow rate, although not critical, is adjusted to smallest flow that will cause steam to condense in chamber.

When steam enters chamber, it assumes the pressure of the evaporator, normally at 3" Hg absolute, because chamber is an extension of the evaporator vapor space. Feed steam is thus immediately superheated due to decrease in absolute pressure.

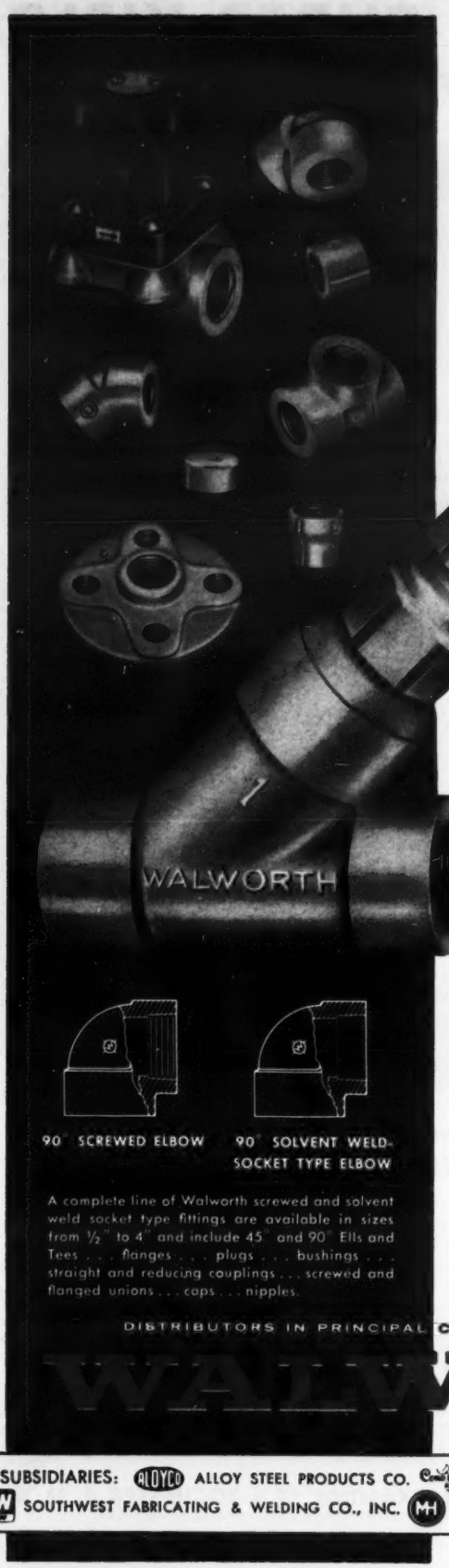
But the chamber, which is air-cooled, removes superheat and condenses some of the vapor. Thus, the resulting temperature is that of saturated steam, or boiling water, at evaporator pressure. And that's the correct reference temperature for accurate b.p.r. measurements.

The other stumbling block for successful b.p.r. control is the tendency to neglect control of evaporator pressure and liquid level. The Stauffer evaporator pressure is controlled by a self-contained spring-and-bellows unit mounted on a port to the evaporator vapor space. This instrument bleeds air into the evaporator to hold the desired pressure. With the installation of the b.p.r. control system a recording pressure gage was added to give electric control for automatic supervision.

Liquid level control is accomplished by a Differential Converter unit which measures liquid level by means of differential pressure. Unit transmits a pneumatic signal to a receiver-controller that adjusts flow of weak acid feed solution to evaporator in order to keep evaporator liquid level constant.

Accessory instrumentation was also installed to measure supply tank liquid level, discharge pump pressure, and steam pressure to evaporator. All instruments are interconnected in an electrical system that automatically shuts down the evaporator if abnormal conditions develop.

Turn to page 219



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Walworth plastic valves and fittings are made of non-aging, non-corrosive and non-toxic unplasticized rigid polyvinyl chloride (PVC). These products are highly resistant to chemical attack and offer the advantages of immunity to galvanic corrosion and high impact strength at temperatures as high as 150°F. Durable and light, Walworth PVC valves and fittings are simple to install, easy to maintain (no painting), and add a smooth, clean appearance to your piping system.

Walworth PVC Y-Globe Valves are designed to regulate the flow of alkalies, acids, and similar corrosive fluids. Walworth PVC Diaphragm Valves* are commonly used in systems handling corrosive fluids, especially those containing suspended materials, and can be furnished with diaphragms suited to your application.

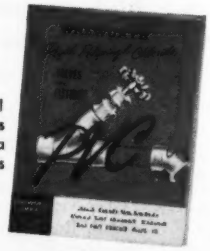
*Hills — McCanna (Saunders Patent)

90° SCREWED ELBOW

90° SOLVENT WELD-SOCKET TYPE ELBOW

A complete line of Walworth screwed and solvent weld socket type fittings are available in sizes from ½" to 4" and include 45° and 90° Ells and Tees . . . flanges . . . plugs . . . bushings . . . straight and reducing couplings . . . screwed and flanged unions . . . caps . . . nipples.

SEND FOR THIS BOOKLET. It describes mechanical and thermal properties, working pressures, sizes and dimensions, application and assembly data for the complete line of Walworth PVC Valves and Fittings. Please use company letterhead.



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When inquiring check 5819 opposite last page

TRUFIN EASY TO USE WHEN RETUBING UNITS

An outstanding feature of Wolverine Trufin is the ease with which it can be substituted for plain tube during retubing operations. In manufacturing, Trufin's ends are left plain. Each end has a heavy wall section which is approximately two gauges heavier than the finned portion of the tube. Result: greater rolling or brazing flexibility at the header. The heavy ends also provide greater protection against inlet erosion.

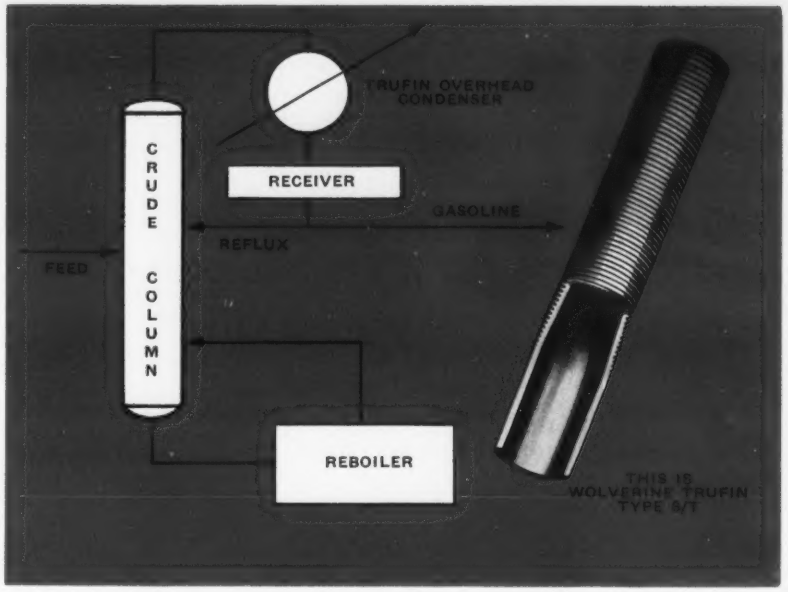
WOLVERINE TRUFIN CUTS DESIGN COSTS

Heat exchangers and condensers designed around Wolverine Trufin Type S/T, can in many cases, be fabricated more economically than with plain tube.

The use of Trufin—with its extended surface—for example, can reduce the number of lineal feet of tubing required to obtain a given heat duty. Fewer tubes mean, in turn, smaller shells, baffles and headers plus a substantial savings in labor. If the unit is to be used in overhead service there is also a saving in the amount of material normally required for superstructures.

NEW BOOK OFFERS COST COMPARISONS

Direct cost comparisons between the use of Wolverine Trufin and prime surface condenser tubing in heat transfer applications are given in Wolverine's new book "Comparative Heat Exchanger Costs." Just off the press, this new book contains valuable information—should be in the reference file of every processing engineer. Write today for your copy.



Retubing Does The Trick:

INTEGRALLY FINNED TUBE BOOSTS DEPROPANIZER CONDENSER OUTPUT

BY ERNEST DODD

Up until recently, in heat transfer work, a refinery engineer didn't have much choice when he wanted to increase heat duty. He could design a bigger unit—with increased surface area—or he could add another unit to those already on stream—providing of course, that he had sufficient room.

Well, it isn't that way anymore.

Nowadays—thanks to Wolverine Trufin® Type S/T—the refinery engineer can increase heat duty simply by retubing with integrally finned Trufin Type S/T. This is exactly what engineers at a west coast refinery did when they needed increased heat duty from an overhead depropanizer condenser on their fluid catalytic cracking unit.

After Trufin Type S/T—446 pieces, 16-feet long to be exact—had been substituted for the plain tube bundle, the initial boost in heat duty was 48%—a highly gratifying figure to all concerned. But that wasn't all.

During its days as a plain tube unit, this condenser had to be taken off stream for frequent cleanings. With Trufin Type S/T in the bundle, the unit has been in production for a full year without requiring cleaning—the first time this has ever happened.

Naturally there's a logical reason for this improved performance.

Wolverine Trufin Type S/T is an extended surface tube—gets its increased surface area from its integral fins which are actually squeezed from the tube wall. Because of this, Trufin has approximately 2½ times more surface area than does an equivalent piece of plain tube. Percentage wise this is an increase of 150%. It is this increased surface area that permits Trufin Type S/T to extract more BTU's per foot of tube.

Tests and authenticated case histories show that when Trufin fouls, the scale buildup follows the fin profile instead of preferring the valleys between the fins. Because Trufin does not present a flat surface, there is a tendency for the scale to fall away—which explains why Wolverine Trufin resists fouling and stays on stream for longer periods than prime surface tube.

CALUMET & HECLA, INC.
CALUMET DIVISION
WOLVERINE TUBE DIVISION
FOREST INDUSTRIES DIVISION
CALUMET & HECLA OF CANADA LIMITED
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Wolverine Trufin is available in Canada through the Unifin Tube Company, London, Ontario.

FINNED TUBE BOOKS AVAILABLE—FREE!

Wolverine Tube, from its years of experience, has compiled and published literature of great interest to those engaged in heat transfer work. Among its catalogs and booklets are the COMPARATIVE HEAT EXCHANGER COSTS BOOK, TRUFIN CATALOG, CONDENSER TUBE CATALOG, PROCESS FLOW SHEET BOOK, WOLVERINE CORROSION CHART and the TRUFIN WATER HEATER BOOK. Any—or all—of these are yours—FREE. Why not write TODAY.

We've Been Asked:

WHEN TALKING OF WOLVERINE TRUFIN® WHAT DO YOU MEAN BY TYPE S/T?

BY ERNEST DODD

In addition to pioneering in the development of integrally-finned condenser tube, Wolverine Tube has also been responsible for coining the various designations used to describe different types of integrally finned tubing. Because of the increasing popularity of Wolverine Trufin®, we are often asked to explain just what these designations mean.

Actually, Wolverine Trufin is available in six different types—each designed for use in specific heat transfer applications. The most widely used is Trufin Type S/T named by Wolverine to identify its use in shell and tube condensers. Trufin Type S/T is a low finned tube with either 16 or 19 fins per inch (depending on alloy). The ratio of outside-to-inside surface area is approximately 3.75 to 1.

Wolverine also produces Trufin Type W/H, so named because it was designed primarily for use in water heaters. Trufin Type W/H is a high finned tube with 11 fins per inch. It has an outside-to-inside surface ratio of approximately 4.75 to 1.

To help the processing industry do a better hydrocarbon cooling job Wolverine developed an all-aluminum Trufin tube with integral fins on the outside and longitudinal fins on the inside. This tube is called Trufin Type I/L (internal longitudinal). It is available with 5, 7, 9, or 11 fins on the outside and has sufficient fins on the inside to approximately double the surface area. In addition to hydrocarbon cooling, Trufin Type I/L is also ideal for air cooling oil or in air-type refrigeration evaporators.

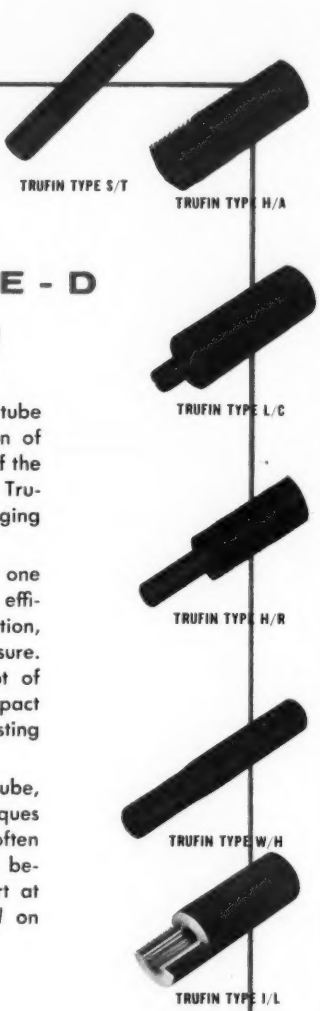
Trufin Type L/C is a high finned-lightweight aluminum tube mechanically bonded to an interior liner of any metal. Type L/C was designed to economically provide an extended surface tube with a liner core permitting adaptation to a variety of corrosion and/or pressure requirements. Type L/C, too, is ideal for air-cooled operations.

To facilitate insert type end connections by brazing, Wolverine developed an extended surface tubing with a controlled inside diameter—named it Trufin Type H/A (high area). Trufin Type H/A is a high finned tube with an outside-to-inside surface ratio of approximately 8:1. Air or gas flows outside the tube to be heated or cooled. The condensing or evaporating liquid is passed through the inside of the tube.

Finally there's Trufin Type H/R (high root)—similar to Type H/A. The root diameter is closely controlled and sufficient wall thickness allowed to permit the removal of fins for rolling into tube sheets. Type H/R is a high finned tube—has an outside-to-inside surface ratio of approximately 8:1.

And there, briefly, is a look into the background of integrally finned condenser tubing—a Wolverine development that is becoming more and more important with the passing of each day.

LOOK



FINS actually

E-X-T-R-U-D-E-D

from the tube wall!

The fact that its fins are part of the tube wall is the secret of the construction of Wolverine Trufin. It's the secret too, of the amazing performance records which Trufin-tubed heat exchange units are hanging up every day.

Because the fins and tube are all one piece, you are assured of constant efficiency. Fins are not impaired by vibration, temperature change or varying pressure. Trufin transfers *more* BTU's per foot of tube—permits you to design more compact units—steps up the capacity of existing ones.

Trufin is fabricated as easily as plain tube, too. In fact, standard tools and techniques are used. Fabricated Trufin units are often stronger than units using plain tube because fins provide additional support at bends. Remember: You can *depend* on Trufin for *dependable* heat transfer!

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Boiling-Point Control

Starts on page 216

Results: Continuous operation has boosted evaporator capacity by 10%. Automatic control has cut operating costs 90%. (Evaporator runs completely unattended except during start-up.) Uniform temperature resulting from continuous operation has reduced scale formation on heating tubes so that maintenance costs have been lowered 25%. Tubes last longer and have much better heat transfer.

Automatic control system has also improved product quality. Product concentration is now consistently controlled within ¼ of 1%.

(ElectroniK boiling-point-rise control system is product of Minneapolis-Honeywell Regulator Company, Industrial Division, Dept. CP, Wayne and Windrim Avenues, Philadelphia 44, Pa. . . . or for more information check 5820 on form opposite last page.)

Testing procedures

Bulletins of 20 and 16 pages cover new testing procedures for absorbers and heat exchangers. They are result of Industry-AIChE Committee efforts to determine standard procedures for conducting and interpreting performance tests.

To obtain new testing procedures on absorbers and heat exchangers remit $1.00 for each to American Institute of Chemical Engineers, Dept. CP, 25 W. 45th St., New York 36, New York.

Water demineralization

Manufacturer's ion-exchange water purification techniques and equipment are discussed and illustrated in six-page bulletin. Demineralization equipment bul — Enley Products, Inc., Dept. CP, 1236 Broadway, Brooklyn 21, N.Y. Check 5821.

For more information on product at left, specify 5822 . . . see information request blank opposite last page.

a series about
PROCTOR SERVICES
for your new products

Mr. Albert G. Blank
Sales Manager
Process Industries Sales

No. 3: from product testing to guaranteed performance

PROCTOR'S guaranteed performance of equipment is based on carefully planned programs of drying tests.

This part of PROCTOR'S service to you represents an important value in your enlistment of PROCTOR service to solve your drying problem. It is a logical sequence to early work with your research team and the preliminary selection of drying methods discussed in our previous series.

This testing program has three main objectives: to establish wet-end processing needs; to determine optimum drying conditions in terms which can be readily translated into full scale equipment specifications; to verify, and very often to improve upon, product quality standards.

Therefore, three groups are involved: the manufacturer of wet processing machinery—filters, de-waterers, centrifuges; PROCTOR, with their proven background in drying; you, with specific knowledge of your product and your market. This "triangular" approach quickly leads to a program which is highly successful in the resolution of the drying problem.

Having conducted the tests themselves, either at PROCTOR'S engineering laboratory, as is usually the case, or under certain conditions, at the customer's plant, we come to the evaluation of the results. This is one of the areas where PROCTOR'S tremendous background in drying, exhibits its greatest value. PROCTOR'S techniques of evaluation, developed in thousands of drying studies, are proven by industry's wide acceptance and trust in the guarantee of performance that accompanies all PROCTOR drying equipment.

Your letter or call will avail you of these PROCTOR Services.

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PROCTOR & SCHWARTZ, INC.
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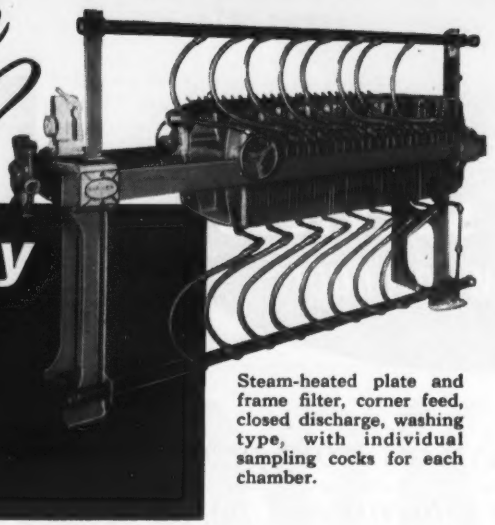
When inquiring check 5823 opposite last page

Can't be Done?

Let's try it in a Filter Press



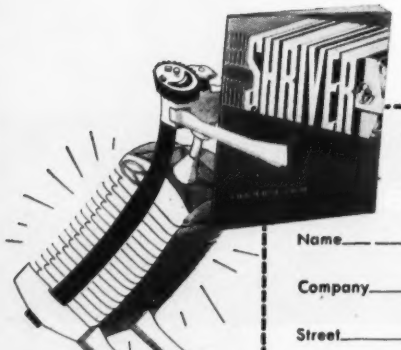
Steam-heated plate and frame filter, corner feed, closed discharge, washing type, with individual sampling cocks for each chamber.

Tried it in your laboratory filter and it didn't work out? Couldn't get satisfactory flow rate or proper cake build-up? Process too slow? The material too viscous or gelatinous or what-have-you?

We've heard all these before. Yet we have proved a thousand times that what the user first considered a tough filtration assignment turned out a routine problem, readily solved in our laboratory. Of course, many problems were challenging, but Shriver experience and designs overcame them, too.

Shriver's long record in solving problems of filtration, washing, extraction or thickening, with the kind of filter press best suited to specific operating conditions, is your assurance of dependable service from laboratory to plant size equipment.

It will pay you to get the Shriver story. Use the coupon.



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City_____ State_____

When inquiring check 5824 opposite last page

Furnace with conveyor offers flexibility and efficiency

Variable-speed drive controls exposure time in unit

Uses: Heating ceramic coatings, powdered metals, and steatite, ferrite, and titanate parts.

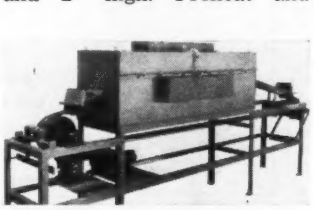
Features: Furnace is rated at 18.5 kw and has two zones of temperature control. Conveyor running through muffle permits volume production and offers versatility by being able to handle parts of varying sizes and shapes.

Description: Muffle runs through entire length of furnace and is 66" long, 5" wide, and 2" high. Preheat and cooling chambers prevent thermal shock. Muffle traps both the protective atmosphere and heat, resulting in lower operating costs.

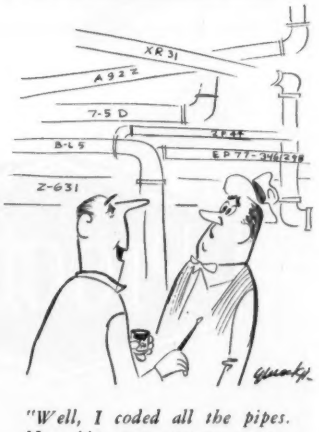
Time that work is in furnace can be controlled by variable-speed drive on conveyor. The 4" mesh belt conveyor runs through muffle that is horizontal where it passes through furnace chamber and sloped downward on either end. Curtain burners on both ends of muffle help prevent entrance of contaminating gases.

In typical application where furnace is used to fire ceramic coatings on resistors, unit is operated at 1370°F under a dry nitrogen atmosphere. Conveyor is run at 5" per minute.

(Belt conveyor furnaces are product of Hevi-Duty Electric Company, Dept. CP, 4210 Highland Avenue, Milwaukee 1, Wis. . . . or for more information check 5825 on form opposite last page.)



Muffle on furnace is 66" long, 5" wide, and 2" high



"Well, I coded all the pipes. Now it's up to you to remember what the code means —"

Miniaturized dust collector is only 1/20 to 1/10 size of conventional unit

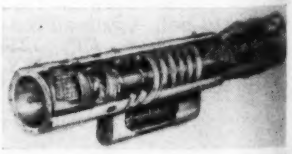
Capable of collecting over 99% of five-plus micron particles

Uses: Cleaning dust-laden air or gas streams.

Features: Dust collector is only 1/20 to 1/10 the size of a conventional unit having equal capacity. Dust collector has over 99% efficiency collecting particles five microns or greater, according to manufacturer.

Description: Unit is a cylindrical device having two essential parts; a mixer section and an eliminator section. In operation, dust-laden air or gas enters unit at mixer section. Here, impingement takes place. Each dust particle is enveloped in water as it passes through a fine spray.

The air and entrained water-enveloped dust pass



Cut-away view of compact wet-type dust collector. Dust-laden air enters at left

through turning vanes as they enter eliminator section. Vanes impart helical motion which causes centrifugal force which separates particles from the air.

Dust-laden water is captured at periphery of eliminator section in blind louvres which are connected to a disposal pump at bottom of unit. Cleaned air passes out of eliminator section through straightening vanes which recover energy of rotation, thus reducing overall draft loss.

Unit can be mounted in existing duct work at point of use, resulting in savings in space and installations. If sufficient pressure to drive gases is not available ahead of collector, a vaneaxial fan may be attained at rear of unit.

Machines are being produced in standard sizes ranging from 2500 to 64,000 cfm. Prototypes have been tested at Allegheny Ludlum Steel Corporation; a Butte, Montana, mine of The Anaconda Company; a phosphate processing plant in Florida; and several other locations in the US.

(Microdyne dust collectors are product of Joy Manufacturing Company, Dept. CP, Henry W. Oliver Building, Pittsburgh 22, Pa. . . . or for more information check 5826.)

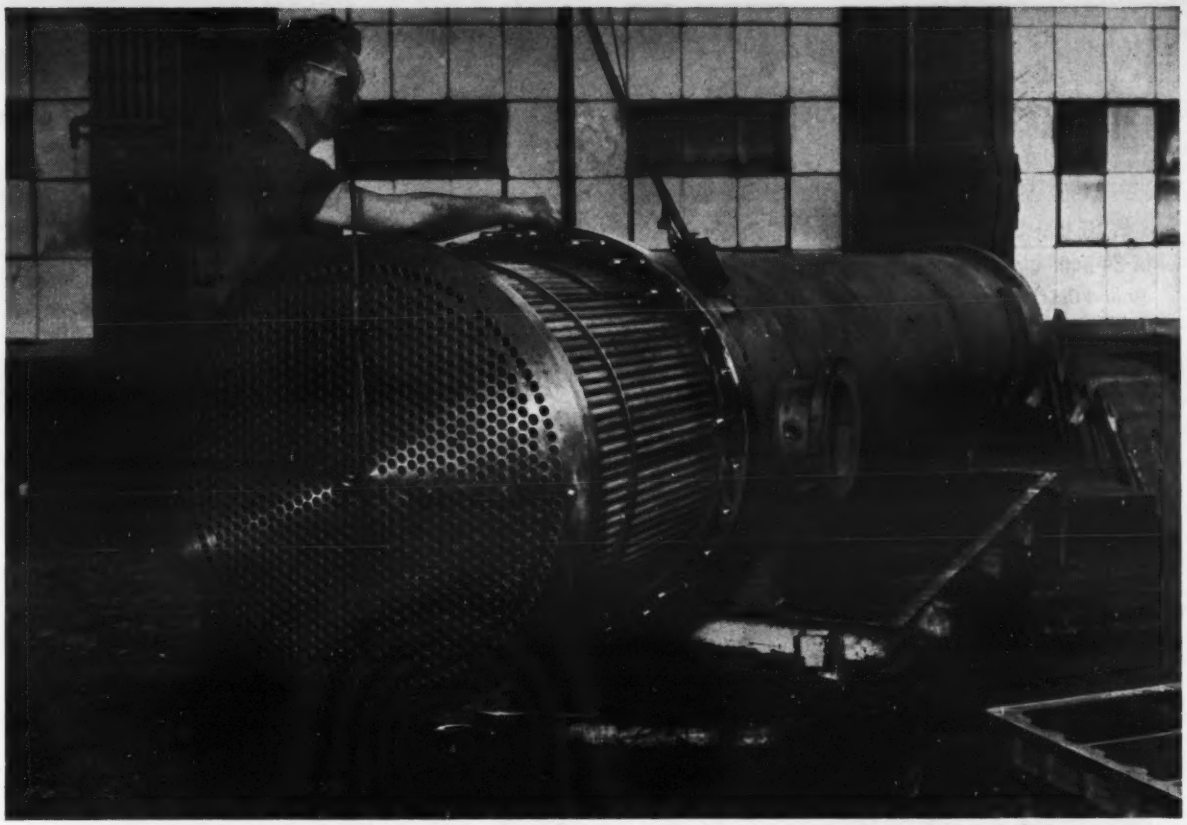
Spray dryer well suited for small quantity production

Units can evaporate 15 to 75, 30 to 150 lb H_2O/hr

Uses: Spray drying pilot plant, semi-works, or small production quantities.

Features: Dryers are compact and versatile. Evaporation rates of the two basic units are 15 to 75 and 30 to 150 pounds of water per hour. Dryers can be modified to boost rates to 200 and 400 pounds per hour.

Description: Units are of sufficient size to obtain qualitative as well as quantitative results. Dimensions of the basic units are: 10'2" high x 8'3" wide x 6'4" deep, and 12'2" high x 9'2" wide x 7'3"



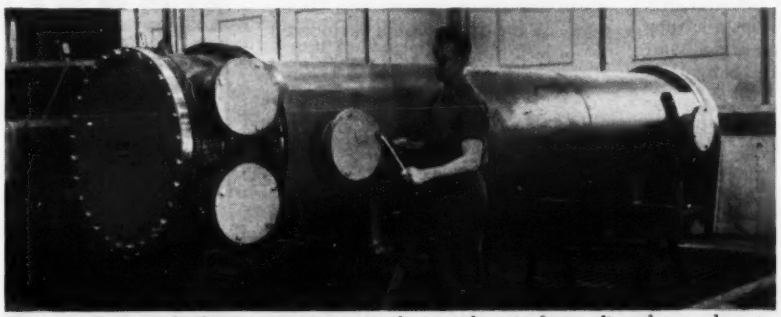
Tube bundle partially removed from shell of General Electric heat exchanger. Fixed-end tube sheet is Ambraloy-917, one of The American Brass Company's aluminum-bronze alloys. Tube sheet is 36⅜" diameter, 2" thick.

Thick, rolled circles of Anaconda Aluminum Bronze available for high-strength tube sheets

Where superior strength and corrosion resistance are required in heat-exchange applications, the use of *rolled* circles of Ambraloy-917 for the tube sheets offers appreciable savings in material cost compared to circles produced by the forging process. The American Brass Company can furnish Ambraloy-917 in rolled circles up to 5" thick, maximum diameters are governed by thickness.

Anaconda sheets, plates and circles are available in a wide range of alloys and sizes for heat-exchange service in marine and stationary-steam power plants, oil refineries and other process industries. Produced by the rolling process, they are commercially flat, accurate in dimensions and are free from the surface imperfections and porosity often prevalent in cast plates. The American Brass Company makes plates for condenser tube sheets of copper and several copper alloys in rectangular sizes up to 156 inches in width and weights up to 15,000 pounds for any shape that can be cut from such sheet. The maximum standard limits for circles are 160 inches in diameter and 11,000 pounds in weight. Half-circles can be produced up to 13,000 pounds in weight.

Special jobs. When specifications call for extremely large plates for special applications, The American Brass Company will gladly cooperate in the solution of such problems. For further information on Anaconda Condenser Tubes or Tube Sheets write: The American Brass Company, Waterbury 20, Conn. 5785



Completed General Electric water-to-water heat exchanger for cooling the condensate recirculated through the hydrogen coolers of a 427,500-kva cross-compound turbine-generator unit. Water box cover is also Ambraloy-917, 36½" diameter and 2⅜" thick.

ANACONDA®

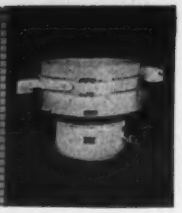
TUBES AND PLATES FOR CONDENSERS AND HEAT EXCHANGERS

Made by

The American Brass Company

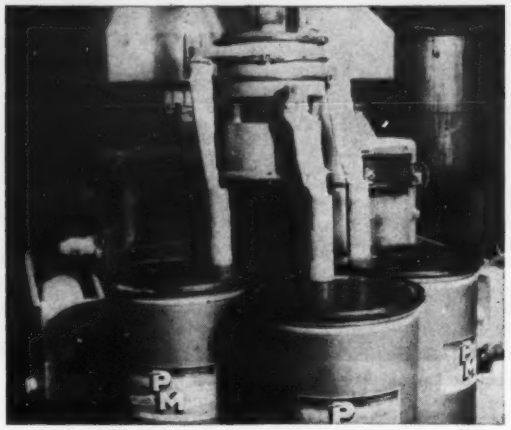
When inquiring check 5827 opposite last page

SCREENING NEWS



SWECO Unit Doubles Sulphonate Salt Capacity in 24-Hour Operation for Chemical Firm

Round-the-clock operation of an 18" diameter SWECO Vibrating Screen Separator has helped double capacity for Essential Chemicals Company of Fredonia, Wis. This company is one of the nation's large manufacturers of alkyl aryl sulphonate (sodium salt). The company uses this sulphonate salt for its own detergents and also supplies other manufacturers.



Dust-free operation of this SWECO *Separator was a major factor in its selection by Essential Chemicals for use in screening sodium base.*

Essential's specifications require a sodium base of uniform particle size, which provides control of product density. Ease of changing screen cloths on the SWECO unit permits rapid selection and installation of desired screen cloth opening. This enables the company to obtain densities specified by customers.

The SWECO Separator requires no attention during operation. Its compactness and dust-free design were major factors in its selection by the chemical firm.

Screening Analysis and Recommendations Available

Your nearby SWECO District Engineer is available to help you with special screening problems. His "know-how" covers 200 different materials . . . wet and dry, coarse and fine, heavy and light. He will demonstrate, in your plant, how a SWECO Separator can screen your material economically and efficiently. No obligation, of course.

A complete data file on screening chemical products plus a 22-page catalog are yours for the asking. Write for Bulletin 5-106-3.

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SOUTHWESTERN ENGINEERING COMPANY
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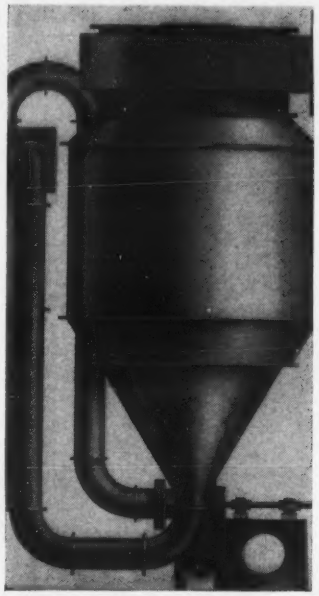
Engineers and Constructors . . . Manufacturers

When inquiring check 5828 opposite last page



Compact dryer is of sufficient size to obtain qualitative as well as quantitative results

deep. Accessories are available for adapting the basic models for use with viscous materials, for producing hollow spheres or thin-walled "beads", or for conversion to "dispersion" type dryer.

All parts exposed to product are type 304 stainless steel. Steam, gas, or electric heating units are available. Standard motors and structural supports are provided. Two fluid atomizers are normally furnished with unit, but centrifugal atomizers can be supplied, if desired.

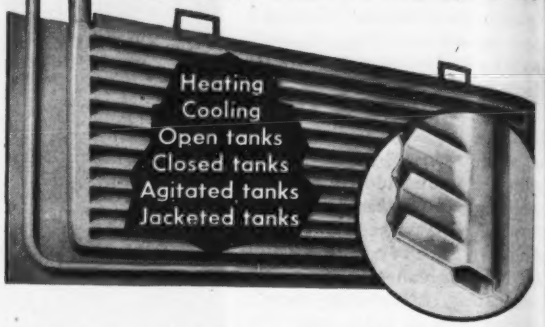
(Spray dryer is product of Proctor & Schwartz, Inc., Dept. CP, 7th Street and Tabor Road, Philadelphia 20, Pa. . . . or for more information check 5829 on form which is located opposite last page.)

Dust collector data

Folder of six pages covers centrifugal collectors for air cleaning and dust collection. Information on collector selection through determination of particle size is presented. "Centrifugal Collectors" — The Kirk & Blum Mfg. Co., Dept. CP, 3133 Forrer St., Cincinnati 9, Ohio. Check 5830.

UNLIMITED OPPORTUNITIES

for saving money in heat transfer operations



High heat transfer efficiency, low cost, light weight and compact design make Tranter Platecoil the easiest, best and most economical answer to a wide range of heat transfer problems in industry. Platecoil replaces pipe coil and saves engineering, fabricating, installation, operation and maintenance costs while giving more satisfactory performance.

Fast delivery from stock

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You'll find our Catalog in Sweet's Plant Engineering file.

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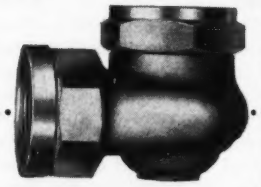

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and better performance

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Modern design. Precision machining. All materials. Thousands of standard industrial spray nozzle types and sizes to choose from. Years of proved experience at your service.

write for this great new catalog today

Ask for our new 48 page Catalog No. 24 . . . the most comprehensive spray nozzle catalog ever produced. Yours for the asking.

SPRAYING SYSTEMS CO.
3216 Randolph Street • Bellwood, Illinois

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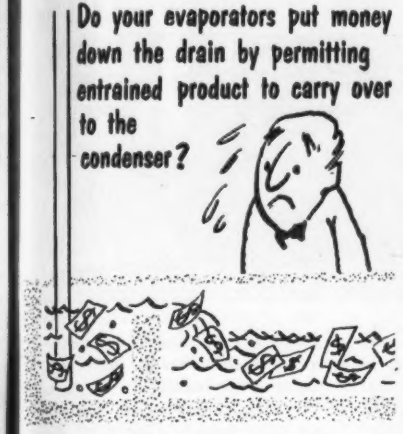
*99.9% plus with YORKMESH DEMISTERS
(MIST ELIMINATORS, ENTRAINMENT SEPARATORS)



YORKMESH DEMISTERS eliminate overhead entrainment losses

Why not take advantage of our vast experience in improving the performance of process equipment. In the past 10 years, the outstanding success of thousands of installations is proof of the superiority of YORKMESH DEMISTERS for entrainment control.

Yorkmesh Demisters are used to improve product quality, to avoid losses, and to increase thruput capacity. Our engineers will give careful consideration to the information you submit and will recommend the best answer to your problem.

YORKMESH DEMISTERS
improve the performance of:
Vacuum Towers • Distillation Equipment • Gas Absorbers • Scrubbers • Evaporators • Knock-out Drums • Steam Drums

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When inquiring check 5833 opposite last page

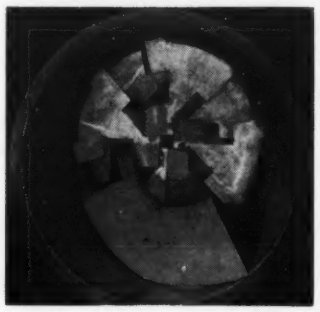
Tube-type cooler ideal for fine particle kiln products

Eliminates tumbling action, cuts dust losses

Uses: Dissipating heat from fine particle rotary kiln products.

Features: Unit is especially suited for cooling fine and soft material because there is no tumbling action or violent contact with air stream to cause dust losses.

Description: Cooler consists of a series of 3 to 5′ diam and 15 to 20′ long tubes attached to the kiln ends parallel to the kiln shell to form a unit rotating integrally with the kiln. To save space, tubes extend uphill from discharge toward feed end of kiln.



In each tube is series of baffles

Within each tube is a series of spiral baffles (see photo) which convey material and serve as intermediary in transfer of heat. Since there is no interconnection between tubes or bracing, each tube expands independently of the kiln.

In operation, cooling air is induced into tubes through the discharge openings and moves toward spiral baffles. The hot kiln product drops into tubes at opposite end, filling each tube to about ½ its volume. As material moves uphill through tubes, it transfers its heat to the rotating spiral baffles and is discharged at other end.

(Tube-type cooler is manufactured by Allis-Chalmers Manufacturing Company, Dept. CP, Milwaukee 1, Wis. . . . or for more information check 5834 on form opp. last page.)

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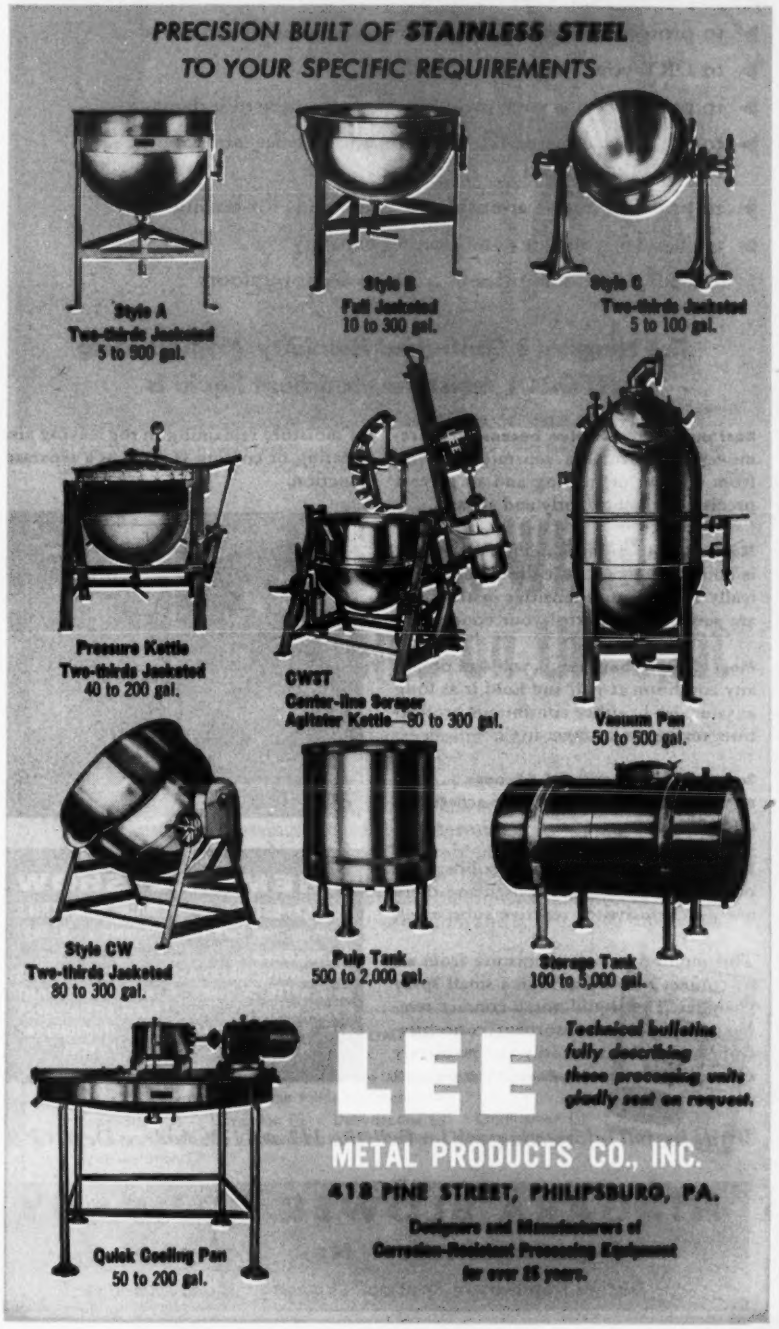
Corrosion-Resistant
PROCESSING EQUIPMENT

PRECISION BUILT OF STAINLESS STEEL
TO YOUR SPECIFIC REQUIREMENTS



LEE
Technical bulletins fully describing these processing units gladly sent on request.

METAL PRODUCTS CO., INC.
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Designers and Manufacturers of Corrosion-Resistant Processing Equipment for over 25 years.

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DRY AIR . . .
PRECISELY as you want it

- to control your product's quality
- to prevent condensation on your product or material
- to prevent changes due to moist air in contact with your product
- to protect your material from dampness
- to protect your processing of moisture-sensitive material
- to DRY your material or product
- to pack or store your product safe from moisture damage
- to get exact moisture control for the precise atmosphere condition you need
- to provide precise atmospheric conditions for testing
- to increase your air conditioning capacity
- to DRY large quantities of fresh air from outdoors

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always.

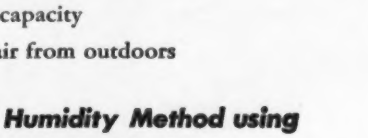
Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.



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District Engineers in Principal Cities of U. S. and Canada

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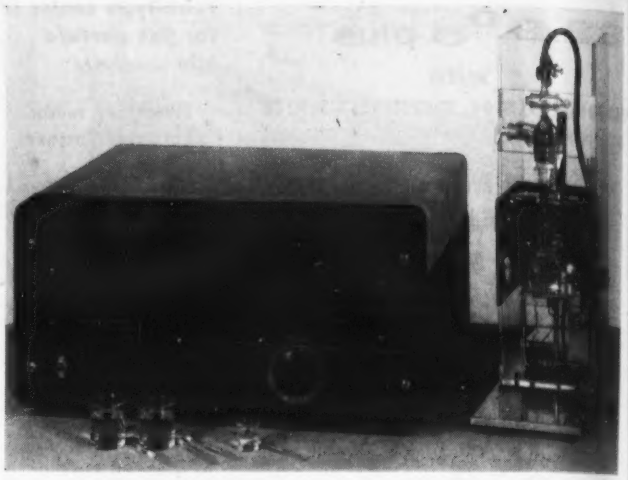


Aperture unit at right "reads" small particle size and distribution. Electronic counter at left registers count and displays pulse on oscilloscope. Fast re-runs are easily made

Here's a different approach to small particle size and distribution analyses —

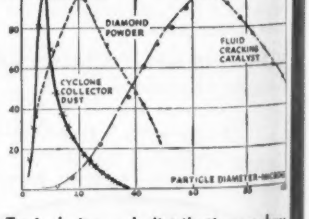
counter "reads" fluid suspensions . . . rapidly . . . in low micron ranges

Uses: Providing rapid, accurate knowledge of small particle size and distribution, counter has been successfully applied to analyses of seed crystals, emulsions, and dusts. One use already has involved analyzing ground pigments. Counting range is approximately 1 to 200 microns.

Promise of instrument includes possible use as continuous analyzer of process streams containing small particles in micron range. Slurries, emulsions, any similar particle-containing fluids could be analyzed *continuously* once suitable sampling and dilution means are designed. Even so, a ten-point particle content and size distribution determination requires only five to ten minutes — sufficiently fast for on-stream control of many processes.

Features: Fluid "reading" overcomes some characteristic troubles of more conventional methods. With dispersants and controlled agitation, agglomeration and other effects caused by surface charge are reduced. Boundary particle error is no longer a problem. And . . . most important, errors caused by human fatigue are eliminated.

Description: Recently - patented apparatus uses forced passage of a fluid through a



Typical size and distribution analyses of cyclone collector dust, powdered diamond, and fluid cracking catalyst particles. Three differently-sized apertures were used—100, 140, and 200 micron—for analyses. Time required for data-gathering — approximately 25 minutes

small aperture having an electrode on each side. As a particle passes, aperture resistance changes in proportion to particle size. Resulting series of electrical pulses is electronically scaled and counted. Curves of cumulative particle frequency and particle size can be charted directly. Weight and area distributions are readily derived.

Originally designed for accurate red blood cell counts, which are in five to ten micron range, electronic counter is based on difference in conductivity between particles and fluid suspension medium. Either can be the better conductor. Suitable conductivity ratio can be obtained by adjusting fluid conductivity.

In a single count, 0.5 cc passes through a 100 micron aperture, requiring only about 10 to 15 seconds. Count is displayed on digital register — usually in range of 100 to 100,000. Repeated counts can be made by re-sampling.

Operation is simple

Basically a matter of feeding diluted samples to counter, operation of instrument is simple. Small sample is taken by pipet and mixed in beaker with diluent. Beaker is placed on spring platform so orifice tube is immersed in sample. Count is automatically made by opening a stopcock and resetting a count switch. After noting count, operator can remove beaker for next sample. Should an additional count of same sample be desired, reopening of stopcock will actuate counter again.

Further description

As already mentioned, control of sample flow is by use of stopcock which allows an external vacuum to pull sample through aperture. Electric current is already flowing through opening. As an individual particle is carried through it, electrical resistance of aperture contents change. Voltage pulse produced is proportional to particle size.

Pulses are amplified and

Turn to next page

Sam Spinner's Mail Box

by Sam Spinner

Dear Sam: We want to remove objectionable particles too small to screen out but large enough to clog a filter quickly. Can you help? (Chemical Company)

Solution: An AT&M Imperforate Basket Centrifugal separated particles and proved easy to clean. The basket was cleaned out by a positive speed unloading drive and plow.

Dear Sam: A noxious slurry containing 20% solids and a small amount of objectionable salts requires separating the mother liquor and removing the salts from the solids.

Solution: Not too complex. An AT&M Perforate Basket Centrifugal spun off the mother liquor, washed away the objectionable salts and spun the solids to the required dryness in an automatically timed cycle.

The objectionable fumes were controlled by a fume type cover. The solids were then easily plowed out by an AT&M unloading drive and discharger.

Send questions to Sam Spinner. If there isn't an answer he'll know. If there is one you'll get it right away.

AT&M Mobile Unit permits centrifugal tests in your laboratory with the materials you use in processing — under your actual working conditions.

Laboratory on Wheels solves problems on the spot

Here's help for any chemical processing plant with a separating problem.

AT&M now sets up a laboratory in your plant. Here it can be certain that the conditions and materials will be identical to those of the actual processing. It can be determined on the spot whether an AT&M centrifugal can solve the problem.

AT&M centrifugals are widely used in Separation, Dehydration, Coating, Filtering, Impregnation and Sedimentation processes.

New models make maximum use of time and space, with top safety. Send coupon for data.

AMERICAN TOOL & MACHINE COMPANY
1423 Hyde Park Ave., Boston 36, Mass.

Please send me my free copy of the new AT&M booklet "Centrifugal Force." I am interested in the following processes:

Separation ☐ Extraction ☐ Dehydration ☐ Clarification ☐
Coating ☐ Filtration ☐ Draining ☐ Thickening ☐ Impregnation ☐
Sedimentation ☐

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When inquiring check 5837 opposite last page

29 YEARS OF MIKRO-D SERVICE AT TOMS RIVER-CINCINNATI CHEMICAL CORPORATION*

#6 MIKRO-Atomizer and MIKRO-Collector handling colors at Toms River, New Jersey plant of Toms River-Cincinnati Chemical Company.

1928 1930 1935 1945 1950 1951 1953 1957

● The history of equipment purchases at Toms River-Cincinnati Chemical Corporation offers an outstanding example of time-tested satisfaction with MIKRO-D Pulverizing and Dust-Collecting equipment. Since 1928, the number of installations in their various plants has increased almost step-by-step with the steady growth of this foremost chemical firm. Today, you'll find a roster of MIKRO-D equipment ranging from laboratory-sized units to mills that process tons per hour of dyes and dyestuff materials, every hour of the day.

We'll gladly make recommendations regarding the product you are grinding. Send us a sample and specifications. You'll discover how MIKRO-D—now serving chemical processing plants throughout the world—can insure a more profitable operation, and a product that meets the highest standards of quality.

* Since 1928, over 30 pieces of MIKRO-D Equipment were installed in the Norwood, Ohio and St. Bernard, Ohio plants, and in the Toms River, New Jersey plant, of the Toms River-Cincinnati Chemical Corporation. The equipment includes MIKRO-Sampimills, Bantam MIKRO-Pulverizers, No. 1, 2 and No. 3 MIKRO-Pulverizers, and No. 6 MIKRO-Atomizers and MIKRO-Collectors.

Mikro-D PULVERIZING MACHINERY DIVISION
METALS DISINTEGRATING COMPANY, INC.
60 Chatham Road • Summit, New Jersey

Genuine Mikro-D Replacement Parts available from large stock within 48 hours.

When inquiring check 5838 opposite last page

Fluid Suspension Counter

Starts on page 224

displayed on oscilloscope so operator can read whether dilution is approximately correct and what threshold should be selected. A microscope permits observing any aperture blockage, and its dislodgement with rubber-tipped rod or by flushing.

Versatility of instrument is such that particle size ranges of 20 to 1 can be handled in a single aperture size. Standard apertures cover 2 to 70 micron range. Special unit is available for ranges extending below one micron and above 100 microns. Instrument can be adapted to provide automatic programming and digital recording of counts.

(Coulter Counter is available from Coulter Industrial Sales Co., Dept. CP, P. O. Box 22, Elmhurst, Illinois. . . or for more inforrmation check 5839 on form opposite last page.)

Versatile lab furniture

Over two dozen interchangeable furniture units for chemical laboratories are described and illustrated in 24-page bulletin. Detailed specifications and information on how to plan a laboratory are included. Bul FS-227 — Fisher Scientific Company, Dept. CP, 303 Fisher Bldg., Pittsburgh 19, Pa. Check 5840.

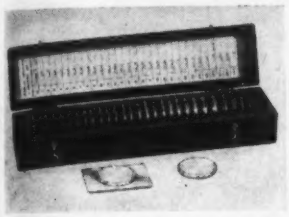
"Wake up, Frankston! We're transferring you from 'tranquilizers' to 'vitamins' immediately."

Radiation absorber set checks radiopurity of isotopes

Establishes absorption curves on radiation

Uses: Establishes absorption curves to check radiopurity of an isotope, or to estimate isotope composition when energy difference of emitted radiation is sufficient.

Features: Absorber set is designed to eliminate "dead spots" in curves. Each absorber is individually calibrated to three significant figures.



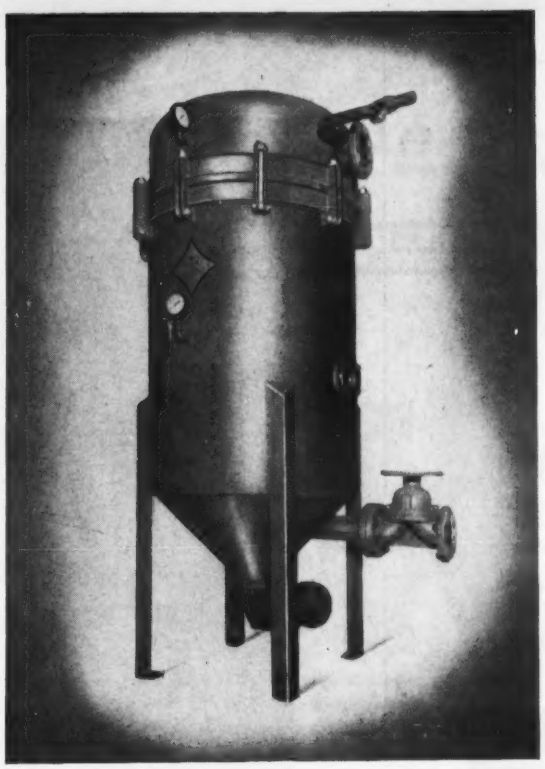
Calibrated absorbers are stored in walnut case for safety

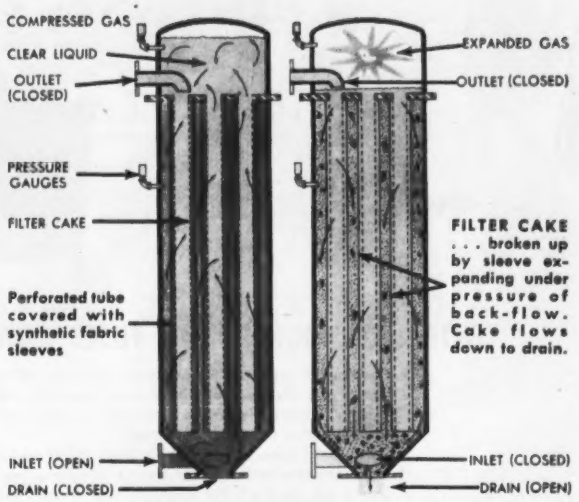
Description: Set consists of 30 calibrated absorbers (25 aluminum and 5 lead) mounted in clear acrylic plastic. Plastic rings are 1⅞ inches diameter to fit standard absorber trays. Carrier slide is furnished with each set of absorbers. Set is packed in separate compartments in a polished walnut case for safe storage.

(Absorber set AB-2 is product of Technical Associates, Dept. CP, 140 West Providencia Ave., Burbank, Calif. . . . or for more information check 5841 opposite last page.)

Laboratory pH meters

Manufacturer's 16-page catalog of laboratory equipment includes such items as fully stabilized, line-operated, pH meter, chromatographic equipment, portable freeze-drying unit, and temperature control water bath shaker. All items are illustrated and described, and prices quoted. Laboratory equipment catalog—Schaar and Company, Dept. CP, 7300 W. Montrose Ave., Chicago 34, Ill. Check 5842.





FILTERING PREPARING FOR HYDRA-SHOC **HYDRA-SHOC**

SELF-CLEANING *Hydra-Shoc** FILTER

PROVIDES EXTREMELY LOW OPERATIONAL MAINTENANCE DUE TO FASTEST CLEANING CYCLE AVAILABLE!

Industrial's new tubular filter creates own air pressure for fast self-cleaning in seconds . . . simply shutting off the outlet valve at the end of a filtering cycle prepares the filter for Hydra-Shoc cleaning. The air trapped in the filter chamber builds up under normal input pressure until a desired point is reached. Then a set of quick opening valves simultaneously shut off the inlet and open the drain. The air, suddenly released with a hammer-like blow, expands the fabric sleeves, instantly dislodging and driving the filter cake through the drain in seconds. You will find this Hydra-Shoc filter exceptionally good for low solids filtration—but remember . . . Industrial also makes Horizontal and Vertical Filters and our engineers can recommend without partiality a system most applicable to your process requirements.

CHECK THESE ADVANTAGES . . .

- No use of filtered water for cleaning
- Small floor space
- Eliminates backflow pumps
- Easy tube maintenance
- Individual tube removal
- Positive, easy sludge removal
- Extra wide tube spacing

Send now for your copy of Bulletin No. 114-1155

*Trade Mark

Industrial **INDUSTRIAL**

FILTER & PUMP MFG. COMPANY
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When inquiring check 5843 opposite last page

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ENGELHARD INDUSTRIES

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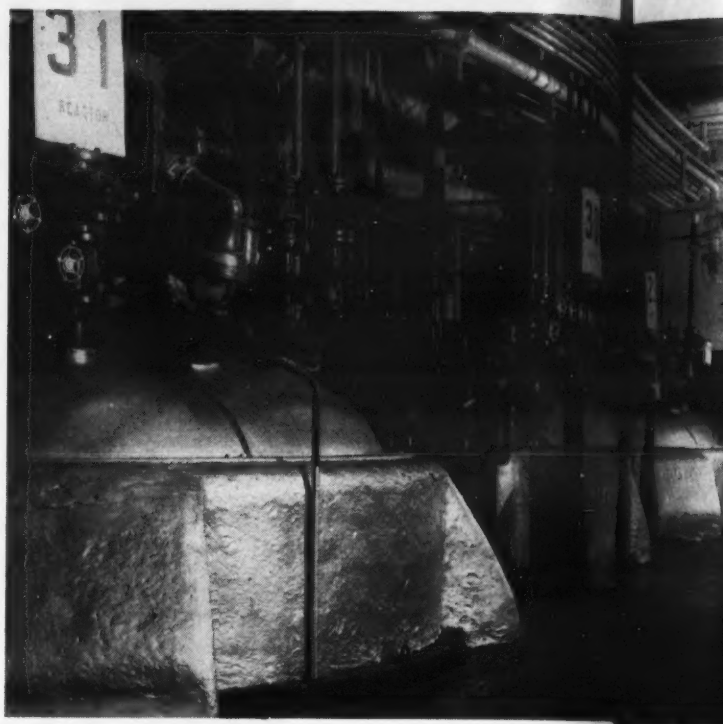


Low level of side-reaction products, only 0.5% . . . was causing a "bottleneck" in butadiene extraction. Time was important.

Mass spectrometer finds process stream impurities . . . quickly

Polymer Corporation puts on water-scrubber . . . is back in full production in 24 hours

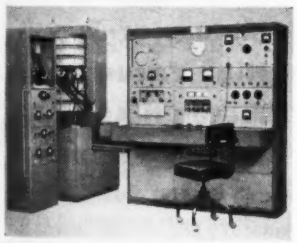
WILLIAM C. CLARKE, Assistant Editor

Problem: In manufacture of butadiene at Polymer Corporation, Limited, Sarnia, Canada, abnormal conditions were seriously reducing solvent's ability to dissolve butadiene. Coincidentally with use of a new calcium-nickel-phosphate catalyst in dehydrogenation unit, low recovery rate of butadiene extraction section was observed. Butadiene is extracted continuously using solvent of cuprous ammonium acetate after dehydrogenating butylenes to butadiene.

Solution: To study cause of bottleneck in extraction process, samples of various plant streams were taken and rapidly scanned by mass spectrometer for extraneous materials.

Analysis revealed that the new catalyst was producing small quantities of water-soluble carbonyls as a result of side reactions in dehydro-

Reaction vessels used in polymerizing hydrocarbon monomers into synthetic rubber at Polymer Corporation, Ltd., Sarnia, Ontario, Canada



Mass spectrometer similar to one in use at Polymer Corporation. Small cabinet at left is inlet system. Magnet and analyzer assembly is in center. Control console at right

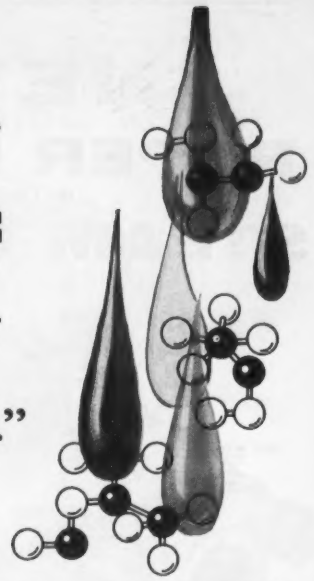
genation unit. Carbonyls were contaminating the butadiene-extraction-unit solvent and seriously limiting its efficiency to absorb the butadiene.

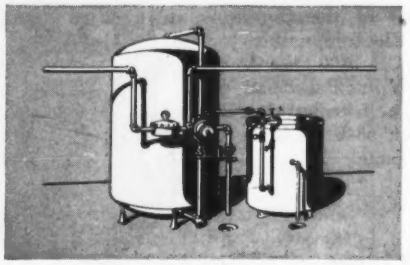
Water soluble impurities were present at a level of approximately 0.5%. While this analysis could have been handled by more conventional means, time required to do so would have been much longer. Time was most important.

Turn to next page

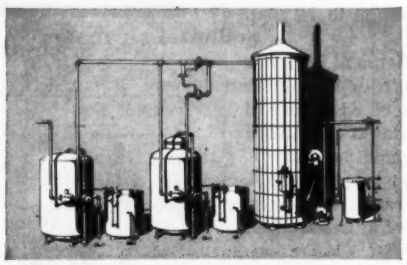
Quote and Unquote:—

"Elgin has dug deeper into ION EXCHANGE than any other firm"

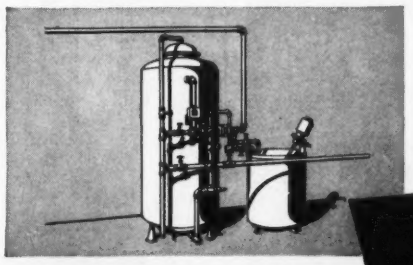




SOFTENING BY ION EXCHANGE — used to eliminate calcium and magnesium hardness from water. All types of ion exchangers available to meet specific conditions.



DEALKALIZATION BY ION EXCHANGE — produces soft water of controlled alkalinity. Various exchangers used, depending on requirements.



DEIONIZATION BY ION EXCHANGE — produces water of better than distilled quality. Ion exchangers of mixed-bed or multi-column design give "tailor-made" effluent to meet process or boiler plant requirements.

An engineer said this when he was asked why he had brought his not-too-simple water conditioning problem to the Elgin organization.

The particular way he put it set us to wondering how many men with water conditioning problems realize the great strides that have been made in ion exchange . . . how many recognize the vital importance of dealing with a firm that has played a leading role in ion exchange development and application.

It is always bad taste—often bad business—to boast; so we won't say that Elgin has dug deeper than *any* other organization. We simply say that certainly no firm has dug *deeper* into ion exchange application than has Elgin during nearly a half century of specialization.

It is squarely on the record that across the years we have *been a part* of the transition from the first simple greensand through the highly specialized ion exchangers and methods that are today accomplishing little short of water conditioning miracles. Just three of almost countless examples of this are given at the left.

Yes, today it can be said that there is a way to "make over" *any* water supply—*your* water supply—to exactly the kind and quality needed for *any* use. When you put your problem up to Elgin you are certain that Elgin "deep digging" will not only assure you the *right* way, but, still more important, the most *economical* way.

Never forget that Elgin works with *all* methods. No bias; no single-track thinking. One of our engineers will be glad to study your conditions and give you a demonstration of Elgin deep digging.

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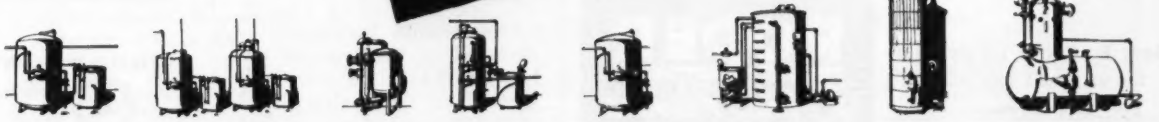
WATER CONDITIONING
SINCE 1908

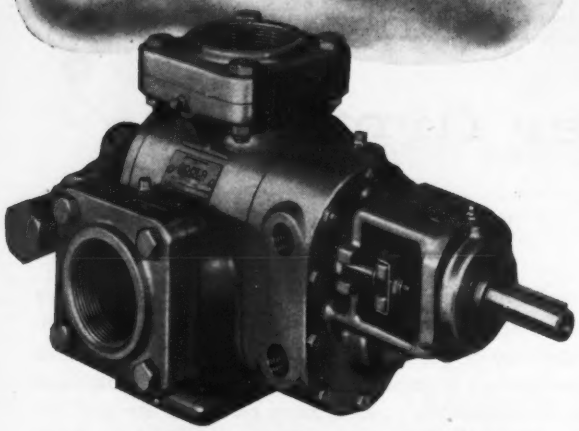
ELGIN SOFTENER CORPORATION
180 N. Grove Avenue, Elgin, Illinois
Representatives in Principal Cities
In Canada: G. F. Sterne & Son Ltd., Brantford



SOFTENERS | ION EXCHANGERS | FILTERS | DEIONIZERS | DEALKALIZERS | CLARIFIERS | DEGASITORS | DEAERATING HEATERS

When inquiring check 5846 opposite last page

NEW ROPER PUMP WITH STEAM CHEST



LOW COST METHOD OF HEAT TRANSFER TO PUMP AND PACKING

Capacities from 27 to 223 GPM
Pressures Up to 100 PSI

This is the same Roper Series 3600 Pump as found in general transfer installations, but with the added feature of a steam chest. A rotary gear unit, it is available with or without relief valve . . . also furnished with gear reduction, if desired.

TWO TYPES OF CONSTRUCTION:

Spec. 3878 Fitted with Bronze Bearings
Spec. 4049 All Iron Construction
All Units Fitted with Aluminum Gaskets and High Temperature Packing

Steam Chest: Located between case and outboard bearing to transfer heat to both pump and packing. A low cost method for handling thick, viscous liquids. Can be used with steam, hot water, or heat transfer oil. Pump and steam chest static tested at 300 PSI. Recommended pressure with steam is 125 PSI.

- **Four ports in steam chest for installation convenience.**
- **Hardened gears and shaft precision ground; steel shaft induction hardened.**
- **Equipped with high temperature packing (600° F. max.) for effective sealing and long life. Pump fitted with aluminum gaskets.**

Send for Bulletin No. 29

Geo. D. Roper Corporation
749 Blackhawk Park Avenue
Rockford, Illinois

ROPER Rotary Pumps

When inquiring check 5847 opposite last page

LABORATORY

Mass Spectrometer

Starts on page 228

Results: Speed with which the mass-spectrometer defined the problem made it possible to place a water scrubber on the dehydrogenation unit product within 24 hours. Plant operating problem was rectified without serious losses in production.

(Analytical mass spectrometer is product of the Consolidated Electrodynamics Corp., Dept. CP, 300 North Sierra Madre Villa, Pasadena, California . . . or for more information check 5848 on form opposite last page.)

Large current range increases speed of analysis

Electrodeposition analyzer has current range to 10 amp

Uses: For chemical analysis of metals. Electrodeposition is specified in 21 of 33 standard methods formulated by ASTM for metal analysis.

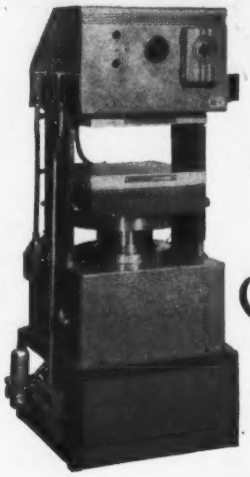
Features: Analyzer has large current range — to ten amperes — for increased speed of analysis.

Alloy analyses can be made rapidly with large current available for "plating out"

Description: Instrument is designed so that current can be controlled manually throughout the analysis. Each of two stations is independent, with its own power supply, voltage - and - current control,

HYDRAULIC PRESSES

20 tons to 500 tons ram pressure



Platen area 8 to 24 inches
Motorized hydraulic system
Controlled platen temperatures to 600° F
Automatic time cycler
Customized to your requirements

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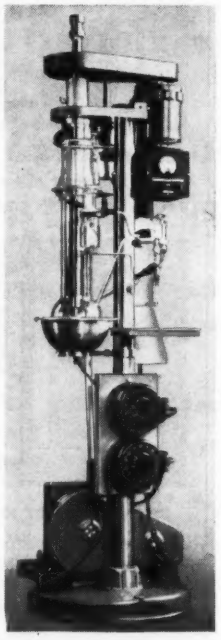
Pasadena Hydraulics, Inc., 1433 Lidcombe, El Monte, Calif.

When inquiring check 5849 opposite last page



New
Fractionating Molecular-Type High Vacuum Still ... ten times more efficient

This is the CEC *Brush Still.*

It separates fractions up to M.W. 900 and higher at pressures as low as 1 micron Hg. Up to 100 cc. of distillate a minute.

Compared with most falling film and pot vacuum stills, it's 900-1000% more efficient in fractionating tall oil, microcrystalline wax, cedarwood oil, polyethylene glycol, ionones, and many other heat-sensitive, high molecular weight substances.

For description and theory of operation, send for Bulletin 3-20.

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Combination "TWO-STAGE" VACUUM PUMP

The Beach-Russ Combination "Two-Stage" Vacuum Pump gives tops in service at the low micron range.

- Faster Pump-Down
- Faster Recovery
- Lower Blank-Off Pressure
- Conditioned Oil Supply
- For Dry or Wet Systems

Write today for NEW "Two-Stage" Bulletin 95

BEACH-RUSS COMPANY
50 Church St. · New York 7, N. Y.
Address Department 46

When inquiring check 5851 opposite last page

volt-ammeter, stirrer, electrodes, and hot-plate if desired. Two different determinations can be made simultaneously.

Operator can use any cell potential up to ten volts. Spring-holding chuck holds stirring electrode in place securely, requiring operator to simply push the electrode in place. Induction motor for stirring has a stainless shaft with silver-graphite brushes to carry the plating current.

Built-in rectifier and step-down transformer convert 115 volts, 50/60 cycle into direct current. Ripples are smoothed to ±2% variation.

(Electro-Analyzer is product of Fisher Scientific Company, Dept. CP, 303 Fisher Building, Pittsburgh 19, Pa. . . . or for more information check 5852 on form opposite last page.)

Small lab fire alarm needs no installing

Emits "howl" heard one-fifth mile away

Uses: Providing alarm for laboratory personnel in event of a laboratory fire.

Features: Small compact fire alarm requires no installation. Can be hung on ordinary picture hook or nail.

Description: Laboratory fire alarm operates on two ordinary flash light batteries. Alarm is actuated when temperature reaches 135°F and a loud noise is produced. Unit can be tested by touching bimetallic strip at base of alarm. If action produces a "howl", batteries are still good and instrument is in operating order. Complete instrument is 2¾" wide by 5⅛" high and 1½" deep. Unit hangs flat against wall.

Lab fire alarm

(Fire Alarm No. G-8555 is product of The Emil Greiner Company, Dept. CP, 20-26 N. Moore St., New York 13, N. Y. . . . or for more information check 5853 on form opposite last page.)

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THE POROUS STAINLESS STEEL MEDIUM FOR LIQUIDS, GASES AND STEAM THAT COMBINES ALL THESE UNUSUAL FILTRATION CHARACTERISTICS —

- **HIGH HEAT RESISTANCE** . . . for operating temperatures as high as 900°F.
- **HIGH TENSILE STRENGTH** . . . to 15,000 psi, able to withstand differential pressures of more than 3500 psi.
- **HIGH CORROSION RESISTANCE** . . . allowing filtration of — or cleaning by — substances that would quickly damage other filter materials.
- **UNIFORM FINE FILTRATION** . . . with standard material down to 5 microns and material for sub-micronic filtration on special order.
- **NO MEDIA DISCHARGE** . . . Independent tests *prove* no product contamination even under conditions of extremely high differential pressures and severe vibration.
- **AVAILABLE** . . . as cartridge-type filters and as specially fabricated or preformed elements. A complete line of standard or special high pressure coded Cuno Housings are available.

*Because no *one* type of filter is best for every need, Cuno — and *only* Cuno — offers you a truly complete line that includes *several* distinct types of filtration media. And because every filtration system must be specified and engineered to individual job requirements, Cuno also offers you a complete application engineering service through the Cuno Field Engineer. Conveniently located in your area, one of these specialists is ready and fully qualified to help select the filter type and model exactly right to solve your problems.

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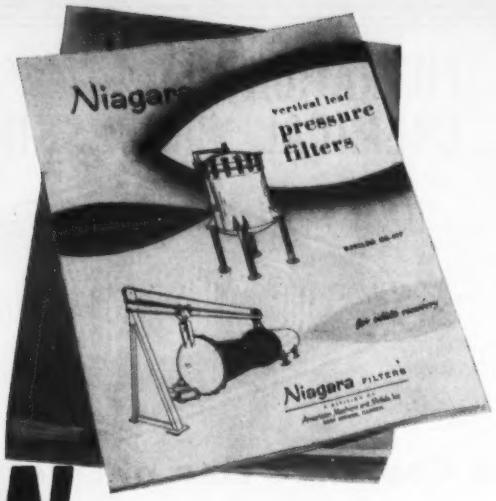
EDGE-TYPE, WIRE-WOUND, SCREEN, FIBER CARTRIDGE and POROUS METAL FILTERS

Filtration Engineers in Principal Cities

When inquiring check 5854 opposite last page



NEW filter bulletin is ready to mail to you

12 pages of data on Niagara vertical leaf pressure filters for liquid clarification and solids recovery. Completely new bulletin contains sections on . . . how these filters operate . . . which model you need . . . design features and modifications . . . leaves . . . accessories . . . sizes, capacities, dimensions . . . and special Niagara services. It will come to you by return mail.

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A DIVISION OF

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Niagara Filters Europe: Kwalkelpad 28, Alkmaar, Holland

Yes, mail 1 copy of your new 12-page catalog for me and ..... copies which I'll give to my interested associates.

NAME AND TITLE

COMPANY

ADDRESS

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SPECIALISTS IN LIQUID-SOLIDS SEPARATION

When inquiring check 5855 opposite last page

briefs

Abstracts of pertinent articles in other industrial publications . . . selected by CP editors as a service to you

Repellant cotton surfaces

This paper deals with the application of fluorochemicals to cotton fabrics to achieve oil and water-repellent surfaces. This treatment also improved resistance to wetting by organic liquids of low surface tension. 10 pages, eight tables, three figures, 15 references. (*"Textile Research Journal," May* 1957, *page* 369.)

System: Carbon dioxide-water-ethanol

For temperatures of 10° to 50°C, phase diagrams for liquid system CO_2-H_2O-C_2H_5OH are reported, for pressures up to 3000 psi. Some new critical data are given. Four pages, one table, six figures, 12 references. (*"Journal of the American Chemical Society," May* 5, 1957, *page* 2071.)

Exchanger tubes

Heat transfer and pressure drop characteristics of finned and plain heat exchanger tubes are compared by means of several methods. Fins in helical form are considered. Five pages, six figures, four references. (*"Petroleum Refiner," May* 1957, *page* 239.)

Area of powders

This paper presents a simplified method for measuring surface areas of fine powders by means of a gas adsorption. Method is based on a modified Brunauer-Emmitt-Teller system. Five pages, nine tables, one figure, four references. (*"Journal of the Electro-chemical Society," May* 1957, *page* 287.)

Aerobic fermentation

Aerobic fermentation studies of waste sulfite liquor from paper mills are reported. Laboratory and pilot plant investigations are included. Seven pages, one table, four figures, eight references. (*"Sewage and Industrial Wastes," May* 1957, *page* 570.)

Pressure regulators

Mechanically loaded pressure regulators are discussed in Part I of this comprehensive treatment. Four pages, nine figures. (*"Instruments and Automation," May* 1957, *page* 876.)

Epoxide resins

Mechanical and electrical properties of epoxide resins are given in survey. Applications of these resins in the electronics industries are featured. Seven pages, four tables, five figures, six references are included. (*"Chemistry and Industry," May* 1957, *page* 530.)

Oxidation of sulfur dioxide

Attention is given to the kinetics of the oxidation of sulfur dioxide over a commercial vanadium catalyst in confined and fluidized beds. Investigations under various operating conditions were made. The possibility of correlating data for fixed and fluidized beds by means of a single parameter is demonstrated. 10 pages, nine figures, 20 references. (*"Journal of Applied Chemistry," May* 1957, *page* 274.)

Conveyor belts

Factors that govern selection of conveyor belts are capacity, drive horsepower, and belt tension. Equations, tables, and charts are given to aid the engineer. Seven pages, seven tables, three figures. (*"Mining and Engineering Journal," May* 1957, *page* 75.)

Gas absorption

The results of an investigation of pressure drops and flooding in a 6-inch diameter gas absorption column packed with half-inch Raschig rings and fiberglass is discussed. Eight pages, 11 figures, eight references. (*"The Canadian Journal of Chemical Engineering," June* 1957, *page* 39.)

Gas chromatography

Gas partition chromatography can be used for analysis of a sample that contains hydrogen sulfide; methyl, ethyl, and propyl mercaptans; dimethyl and diethyl sulfides; and thiophene. Three pages, five figures, 16 references. (*"Analytical Chemistry," June* 1957, page 925.)

Diammonium phosphate

Production of diammonium phosphate by continuous vacuum crystallization is covered under headings of description of process, centrifuge, drier, handling of dry material, losses, and impurities. Four pages, three tables, two figures, seven references. (*"Agriculture and Food Chemistry," June* 1957, *page* 437.)

Solar engines

This theoretical analysis of solar engines uses the technique of the analog circuit. Deductions that may assist in the design of engines for use in arid lands are made. Three pages, five figures. (*"Mechanical Engineering," May* 1957, *page* 445.)

Equilibrium data

The paper discusses theoretical equations available for predicting vapor-liquid equilibrium data from properties of pure components. The method involves prediction of the constants for Clark's equation. Empirical equations used to evaluate these constants include the solubility parameter of Hildebrand. Three pages, one table, two figures, 23 references. (*"Industrial and Engineering Chemistry," June* 1957, *page* 1058.)

Pandux tester

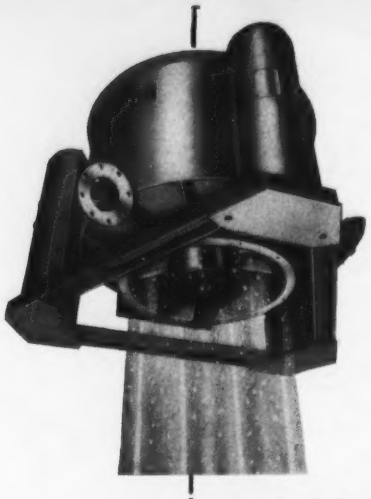
This is a report of an investigation on the Pandux tester for determining the comparative resistance values of latex foam rubber materials. Calibration of the tester is also included. Five pages, two tables, six figures, three references. (*"Rubber Age," June* 1957, *page* 460.)

Rheological properties of aqueous suspensions

A report of an investigation to determine the rheological behavior under various rates of shear of aqueous suspensions of finely divided magnetite, galena, and ferrosilicon is discussed. The importance of consistency is noted. Eight pages, five tables, 10 figures. are included in the report. (*"The Canadian Mining and Metallurgical Bulletin," May* 1957, *page* 261.)

Insulation

The following aspects of low-temperature insulation are covered: mechanics of vapor pressure; significant properties of insulating materials; tricks of the trade; application of process units, lines, fittings, accessories; and proper maintenance. 15 pages, one table, 11 figures. (*"Petroleum Processing," June* 1957, *page* 98.)



Tolhurst centrifugal cuts 48 processing hours down to 8

In a leading chemical plant, one Tolhurst Batch-Master centrifugal is now processing the same volume of fine organics in 8 hours as two other centrifugals formerly did in 24 hours. The reason: Tolhurst's hydraulic unloader and bottom discharge unload the solids in just 30 seconds. The other batch centrifugals with manual unloading took 15 minutes or more. And Tolhurst labor savings on the job amounted to 16 manhours a day.

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A DIVISION OF
American Machine and Metals, Inc.
Specialists in liquid-solids separation
Dept. CPT-957, EAST MOLINE, ILLINOIS

Send your free 4-page Bulletin TC-14-56 giving full data on Batch-Master Centrifugal.

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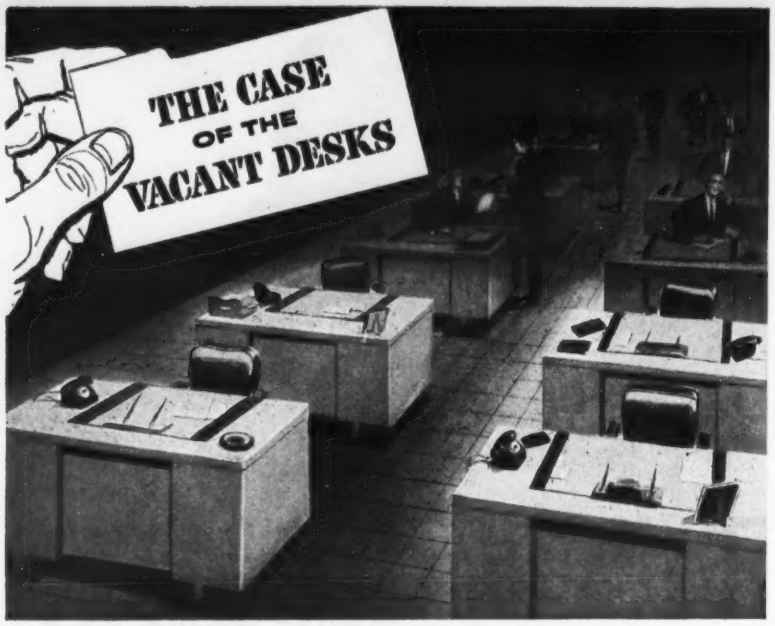

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When a Foote Bros. Distributor has a customer or a prospect with a "tough" or unusual drive problem—one requiring the broad experience and knowledge of a power transmission specialist—he knows that a Foote Bros. Field Engineer will be available to help find the answer.

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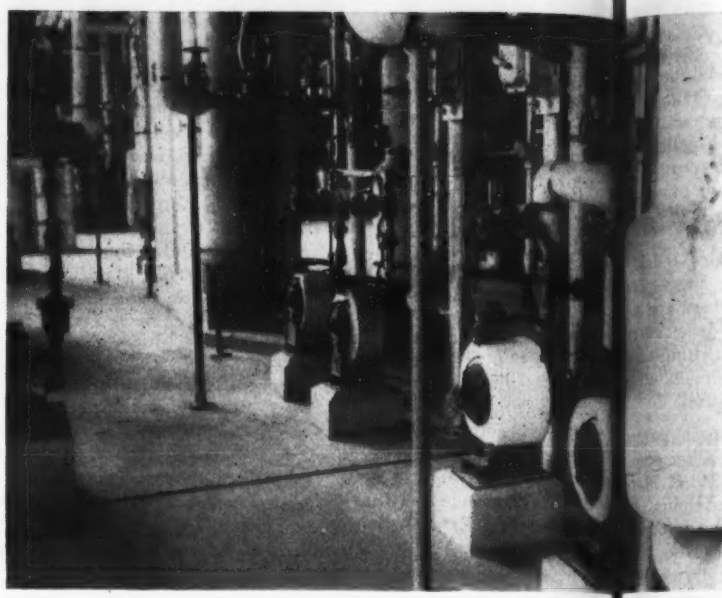

To prevent contamination or loss of high-value, high-purity products Newport Industries picked . . .

seal-less centrifugal pumps for positive leak protection

THEODORE W. WETT, Assistant Editor
with S. J. SPITZ, JR., Assistant Chief Engineer
Newport Industries Co., Div. of Heyden Newport Chemical Corporation

Problem: Leaks, when you're manufacturing high-purity pharmaceuticals, can be costly. At Newport Industries' Fine Chemical plant in Pensacola, Florida, production of synthetic USP Menthol and Camphor, NF Thymol, and other high-purity products demanded positive protection against high-value product loss through pump stuffing boxes and seals or contamination caused by packing gland lubrication. A positively closed system of fluid handling was desired for wide range of chemical reagents, corrosive and non-corrosive, at temperatures from 60 to 300°F. Pumping services ranged from 10 gpm at 80′ of head to 4 gpm at a head of 45′.

Solution: When the multi-million dollar plant went on stream in mid 1955, 45 seal-less centrifugal pumps began to handle the movement of raw materials, intermediates and end products relating to synthesis of pharmaceuticals and rubber chemicals.

Pumps are built with pump chamber bolting directly to motor end bell. Pumped fluid is allowed to enter motor section but is isolated from stator windings by a non-magnetic

Four of 45 sea
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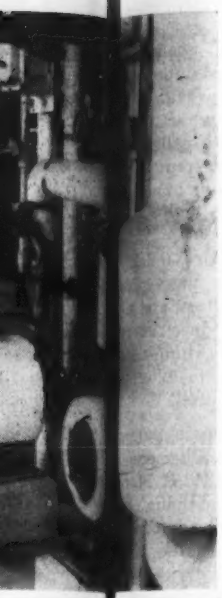


Four of 45 seal-less centrifugals handling high-value pharmaceuticals at Newport Industries.

corrosion-resistant liner placed in stator bore. Rotor and bearings are thus submerged in pumped fluid.

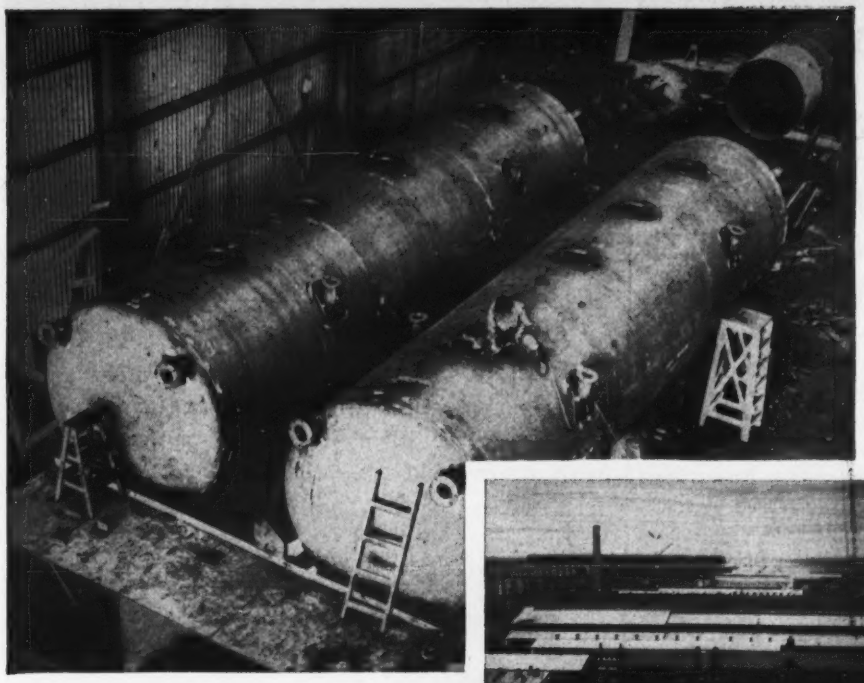
A tube running from periphery of volute to rear of pump circulates a portion of pumped fluid through rotor chamber back into eye of impeller. This fluid circulation serves to cool rotor, bearings, and stator, and also to lubricate bearings.

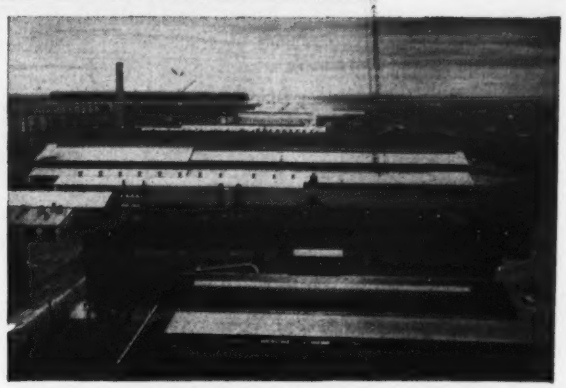
Bearings are a slip fit in their housing and are easily removed for inspection or replacement without special tools and without breaking piping connections.

All stators are protected with Class H high-temperature electrical insulation. Pumps were furnished with explosion-proof enclosure since many fluids handled are highly volatile and hazardous. Units used for intermediates and final products are stainless steel. Where necessary they are steam traced and insulated or have an integral steam jacket to maintain required fluid temperatures.

Results: Pumps can't leak because they have no seals, stuffing box, or packing. Ab-

Turn to next page





A Mile of Shops – Each shop is devoted to a special type of heavy production. Included are complete Machine Shops, casting, forging and other facilities which offer all of the advantages of the execution of the complete job.

A half mile of pressure vessels

These are two of seventy – over ½ mile – of 38½-foot vacuum tank casings built to meet the quality requirements of a well-known processor.

The buyer also benefits from many savings made possible by Newport News extensive heavy fabrication equipment and the sixty years experience in using it.

Do you plan installations of heavy production equipment? You can command the services of Newport News for weldments of corrosion-resistant, alloy and clad metals in almost any size or shape, plus the required engineering background and complete welding and stress-relieving skills.

It will pay you to get the facts, shown in *Facilities and Products.* As you glance at its photos and brief captions, you'll see why Newport News can turn out – at low cost – specialized heavy equipment for process plants.

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STEELCOTE CORROSION NEWS

1957 REPORTING THE LATEST DEVELOPMENTS IN CORROSION CONTROL 1957

STEELCOTE EPOXY RESEARCH HAS PRODUCED MANY NEW PRODUCTS

In addition to EPO-LUX 100 and ZINC RICH ZINC DUST PRIMER, Steelcote research has produced epoxy products that set new standards of performance in the fields of floor repair and resurfacing, tank linings, boat bottom construction and repairs of cracks in metal. In addition, Steelcote manufactures a 15-minute dry floor enamel, DAMP-TEX wet surface enamel, HALTS-RUST for rusted metal and more than 100 other products.

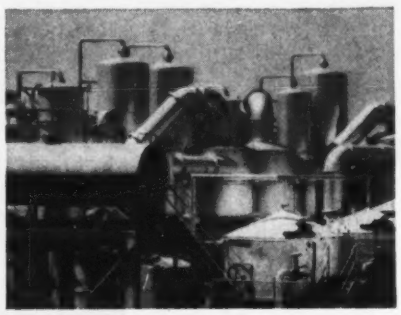
INVITATION TO CORROSION ENGINEERS

For information on any Steelcote product or for engineering service, write Dept. 8, Steelcote Mfg. Co., 3418 Gratiot St., St. Louis 3, Mo., U. S. A. In Canada: Steelcote Mfg. Co., Ltd., Rodney, Ontario. Jobbers in principal cities.

Steelcote Epo-Lux Zinc Rich Zinc Dust Primer Licks Industry's Tough Corrosion Problems

Adhesion and Flexibility of Steelcote Epoxies Make Possible Cathodic Action of Galvanizing In On Site Application at About 1/3 the cost

Ninety per cent pure zinc metal coating, epoxy impregnated for adhesion and flexibility, makes possible overcoats of EPO-LUX which protect against acids, alkalis, salts and solvents. This combination gives the longest-lasting, most effective corrosion control of any cold applied on site coating. We invite you to undertake an immediate test application.



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GRIPHOIST TIRFOR Saves Man-hours for you on Maintenance and Installation... *Safety Approved*

GRIPHOIST TIRFOR

One man often does the work of a crew of 4 to 6 men

1. Repairing heavy equipment in field.
2. Removing heat exchanger tube nests.
3. Removing baffles in catalyst towers.
4. Installing and repairing heavy pumps.
5. Hoisting and pulling heavy loads where power machinery is not available.
6. Loading and unloading trucks.

Ask your dealer or write

Princeton Griphoist, Inc. 32 GEORGE STREET BOSTON 19, MASS.

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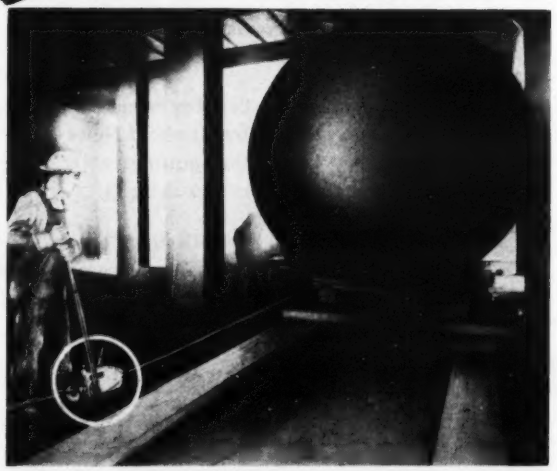

One man using a GRIPHOIST places heavy tank in 5 minutes.
Manually-operated; portable; light weight 42 lbs.; unlimited travel 1/2" wire rope; rated 3300 lbs. single line to 6 tons 4-part line.

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ENGINEERING

Seal-less Pump

Starts on page 234

solute purity and quality of products are assured because of closed system provided by pumps. Newport reports that results have been excellent in providing positive protection against product contamination or possibility of high-value product loss.

Since bearings are quickly accessible, proper preventive maintenance (bearings are inspected at least once every sixty days) is not time-consuming or costly. No external lubrication is required.

(Seal-less centrifugal pumps are a product of Chempump Corp., Dept. CP, 1300 E. Mermaid Lane, Philadelphia 18, Pa. . . . or for more information check 5861 on the convenient Reader Service slip opposite last page.)

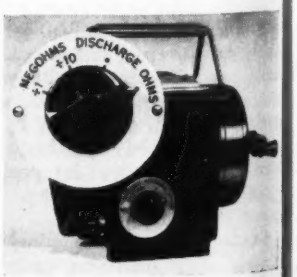
Increases versatility of insulation tester by adding switch

Uses: Measuring resistance of insulation on electrical equipment.

Features: Addition of four-position switch increases versatility of instrument. Measurements down to 10,000 ohms and discharge of capacitors in apparatus under test are features of switch.

Description: On-positions of switch include "Ratio", "Discharge", and "Ohm Scale".

"Ratio" switch divides regular megohm scale by 10. Thus instrument having normal range of 0 to 1000 megohms also has range of 0 to 100 megohms on same scale with



Four-position switch increases versatility of insulation tester

ratio switch.

"Discharge" switch permits discharge of capacitance in apparatus under test.

"Ohm Scale" switch having range from 0 to 10,000 ohms is used in addition to and independently of "Megohm" scale.

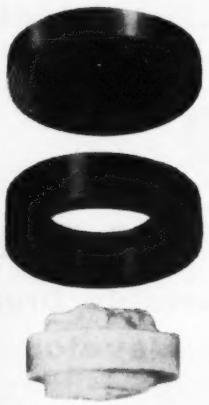
In addition Earth, Line and Guard terminals are so arranged to require no change of connections when switching to ohm scale.

(Meg type Megger insulation testers are manufactured by James C. Biddle Co., Dept. CP, 1316 Arch St., Philadelphia, Pa. . . . or for more information check 5862 on form opposite last page.)

Furnish rupture discs for operating limits up to 650°F

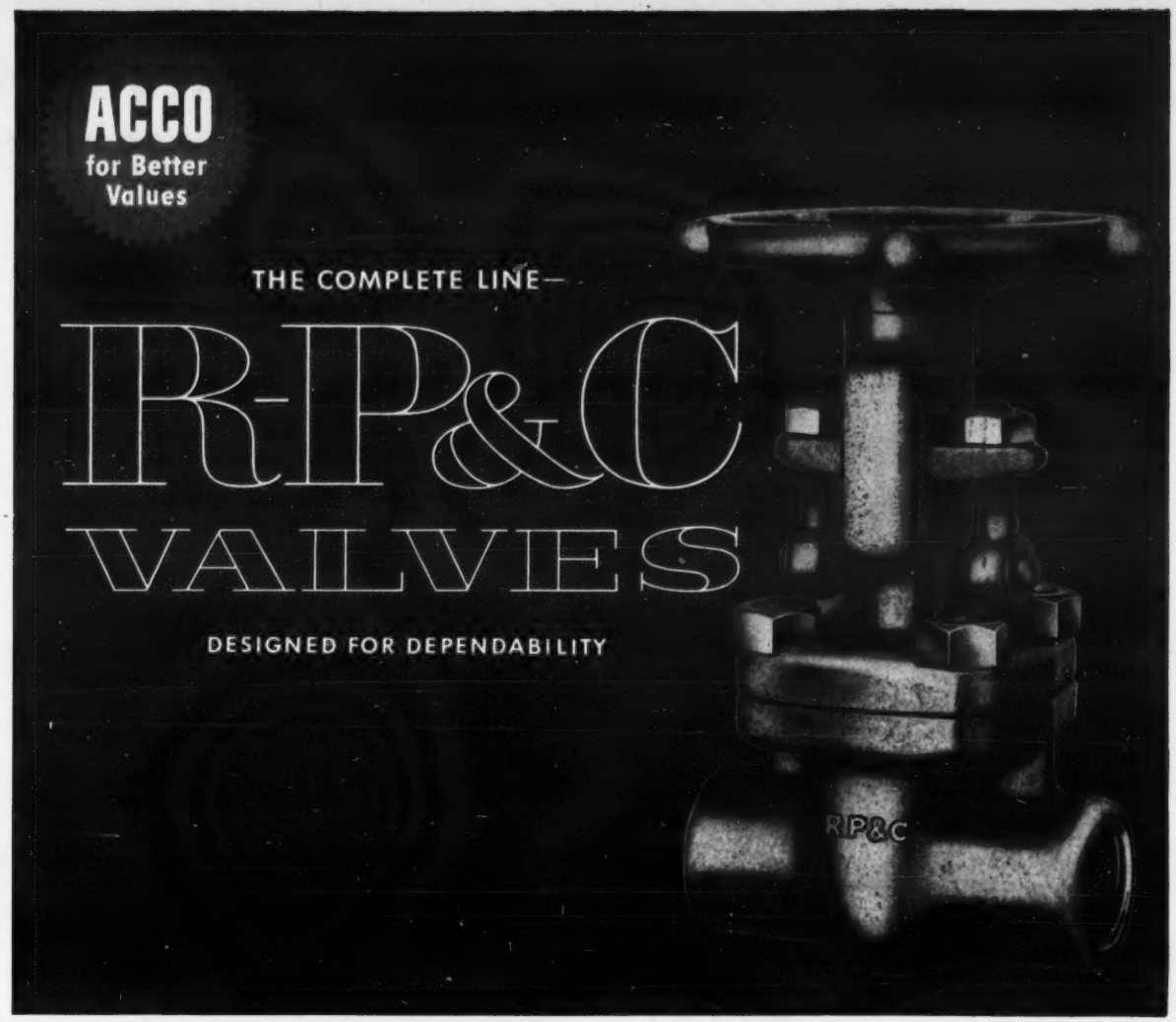
Uses: For applications with gas or liquid; designed for mounting in standard ASA flanges.

Features: Unit is available for operating temperatures up to 650°F.



Impervious graphite rupture discs for gas or liquid are available for operating temperatures to 650°F

Description: Impervious graphite rupture disc is accurate to ±5% of rated burst, and is available for use at 75% of rated burst. It is unaffected by practically all corrosives. Disc provides almost 100% clean rupture to permit maximum opening for



R-P&C FORGED STEEL GATE VALVES ARE NOW IMPROVED TO GIVE EVEN BETTER SERVICE

R-P&C Forged Steel Gate Valves, developed specially for the power, petro-chemical and process industries, are now better than ever. These dependable valves have been improved for greater safety, better performance and longer service life.

Illustrated above is a general purpose valve of the 800 Series; it is rated at 2500 PSI at 100° F., or 800 PSI at 850° F., and is furnished in eight sizes from ¼" to 2". It is available with either screw (F-56) end or socket weld (F-57) end, and with conventional and full port openings. Also available in flanged ends with conventional port openings in 150, 300 and 600 lb. with A.S.A. standard flanges and A.S.A. standard face to face. For details, write for Booklet DH-80.

The R-P&C Line is Complete

Whatever your valve requirements may be, *look first to your R-P&C Distributor.* The R-P&C Valve line includes gate, globe, angle and check valves in all standard valve materials—bronze, electric iron and cast steel, as well as the forged steel line described above. An exceptionally wide range of styles, sizes and pressure classes is available. In addition, R-P&C offers a full line of cast steel fittings, also specialties such as asbestos-packed cocks, bar stock valves, Lubrotite gate valves and other items. Order through your R-P&C Distributor. For complete R-P&C catalog, write our Reading office.

FREE WALL CHART
"How to Protect Your Valves"
Installation pointers, operating tips, clues to longer valve life. They are all on this 22" x 17" wall chart. Write for your free copy.

R-P&C VALVE DIVISION
AMERICAN CHAIN & CABLE

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ACCO

When inquiring check 5863 opposite last page

safe escape of excess pressure. Burst characteristic is not affected by varying temperature.

Discs are available in standard diameters from 2 to 12" for pressures from full vacuum to 100 psi. Other discs are available to 24" diameter at burst ratings to 250 psi.

("Impervite" rupture discs are product of Falls Industries, Inc., Dept. CP, Aurora Rd., Solon, Ohio . . . or for more information check 5865 on form opposite last page.)

Condenser, exchanger tubes

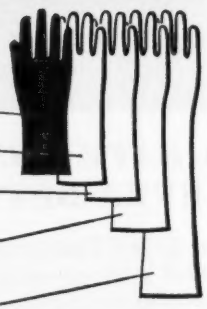
Applications and specifications for condenser tubes for main steam condensers, and straight length heat exchanger tubes for tubular heat exchangers are presented in 24-page bulletin. Estimating data and engineering service information are included. Condenser and heat exchanger tube Bul—Phelps Dodge Copper Products Corp, Dept. CP, 300 Park Ave., New York 22, N. Y. Check 5866.

Our thanks for this one go to David R. Gibbs, Philip Carey Mfg. Co., Lackland, Ohio

These Stanzoil® Milled Neoprene Gloves Guarantee Positive Liquidproof Protection in 103 Basic Oils, Acids, Caustics, Greases, Solvents

Black All Neoprene Stanzoils With Non-slip Grip

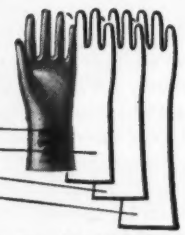
Model	Weight	Fingers	Length
N-31	Light	Straight	10½"
N-35	Light	Curved	10½"
N-32	Medium	Straight	11"
N-36	Medium	Curved	11"
N-41	Heavy	Straight	12"
N-44	Heavy	Curved	12"
N-51	Heavy	Straight	14"
N-33	Heavy	Straight	14"
N-54	Heavy	Curved	14"
N-71	Heavy	Straight	18"
N-73	Heavy	Straight	18"
N-74	Heavy	Curved	18"



White All Neoprene Stanzoils With Smooth Finish

Model	Weight	Fingers	Length
N-30	Light	Curved*	10½"
NW-31	Light	Straight	10½"
NW-32	Medium	Straight	11"
NW-41	Heavy	Straight	12"
NW-51	Heavy	Straight	14"

*Non-slip



FREE Hand Protection Analysis . . . Send a description of your job requirements (length, dexterity, wear resistance, chemicals used, importance of safe grip, hot or cold temperature extremes, fatigue factor and sizes) to our "Hand Protection Clinic." New catalog and price list available on request.

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241 Tiffin Road, Willard, Ohio

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NEW ACME Full Vision "SPEC" MASK

At Last . . .
GAS MASK PROTECTION
For Eye-Glass Wearers

If you wear eye glasses, you no longer have to put up with the hazard of ill-fitting gas masks worn over your regular spectacles. This exclusive new Acme "Spec" mask now gives you a face piece with all the proved Acme safety features PLUS built-in eye glasses ground to your individual prescription.

You can get the Acme "Spec" mask complete with personal lenses by sending your doctor's prescription with your order. Or, if you prefer, the mask can be furnished with stirrup bracket and front ready for your doctor to mount your proper lenses.

Either way, you get the perfect vision, safety and comfort along with the Acme advantage of one face piece serving multiple uses.

For details on this timely Acme development, write for Bulletin No. 576 and No. 576-A (Prescription Form).

ACME PROTECTION EQUIPMENT CO.
1219 Kalamazoo Street, South Haven, Michigan

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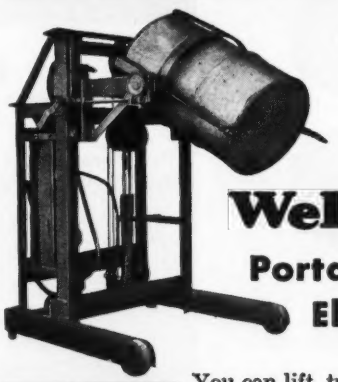
Simplify, Speed Up
DRUM HANDLING



with New Weld-Bilt Portable Drum Elevator

"Weld-Bilt" PRODUCTS

You can lift, transport, store and DUMP all sizes of drums faster, easier, with this new WELD-BILT Portable Drum Elevator. Unique worm-gear tilting mechanism makes "last-drop" dumping safer, more efficient, with minimum effort. Lift, electric-hydraulic operated, is also available for hand operation or fully electrified. Jack-up type steering permits easy, safe positioning.

Write for prices on this important time and labor-saver.

WEST BEND EQUIPMENT CORP.
MATERIALS HANDLING ENGINEERS
322 Water Street, West Bend, Wisconsin

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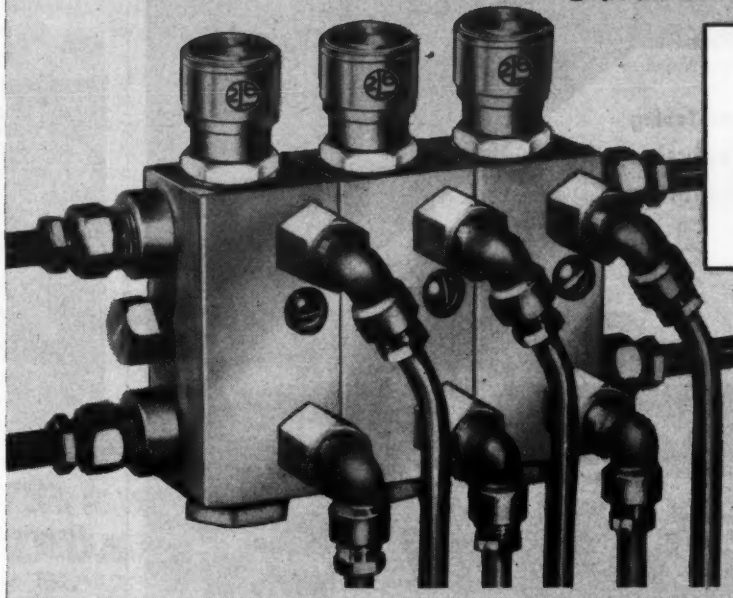
FASTER... FOOLPROOF... LESS COSTLY!

Meet toughest lubrication requirements

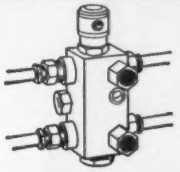
with this centralized

ALEMITE ACCUMATIC SYSTEM

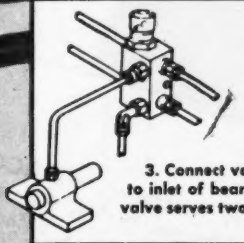
Can be installed on any machine in 4 easy steps!



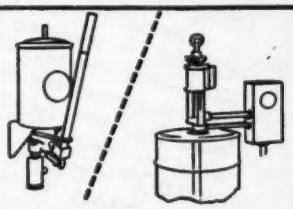
1. Remove grease cups or grease fittings.



2. Connect each valve in system to its two lubricant supply lines.



3. Connect valve outlets to inlet of bearings. (Each valve serves two bearings.)



4. Provide central pump for supplying lubricant to system.

Type II Accumatic Valve

Handles difficult multiple-bearing lubrication under all conditions. Fully sealed for clean lubrication of power shovels, cement kilns, conveyors—any outdoor or indoor installation. Operates whether completely immersed in fluid . . . covered by dirt or grit . . . or protected by anti-corrosive paint. For fluid oil or light grease. Four sizes, delivering from .050 to .500 cu. in. of lubricant.

Fully hydraulic—no springs to adjust or replace.

Now available with Lubrication Recording Cycle Counter—for a fully automatic record of bearing lubrication!

Tests show no appreciable variation in the amount of lubricant discharged after 73,312 cycles—equal to *122 years of twice-a-day service!*

ALEMITE ACCUMATIC ADVANTAGES!

- Prevents application of wrong lubricant.
- Seals completely against damaging dirt, grit and water.
- No parts are neglected—lubricates inaccessible and dangerous bearings at regular intervals.
- Eliminates product spoilage due to over-lubrication.
- Eliminates point-by-point lubrication methods—services all bearings in one operation.
- Delivers exact amount of lubricant to bearing.

ALEMITE
REG. U. S. PAT. OFF.
Division of STEWART-WARNER CORPORATION

STEWART SW WARNER

FREE! Alemite Accumatic Catalog

Alemite, Dept. K-97
1850 Diversey Parkway, Chicago 14, Illinois
Please send me my free copy of the complete Accumatic Catalog.

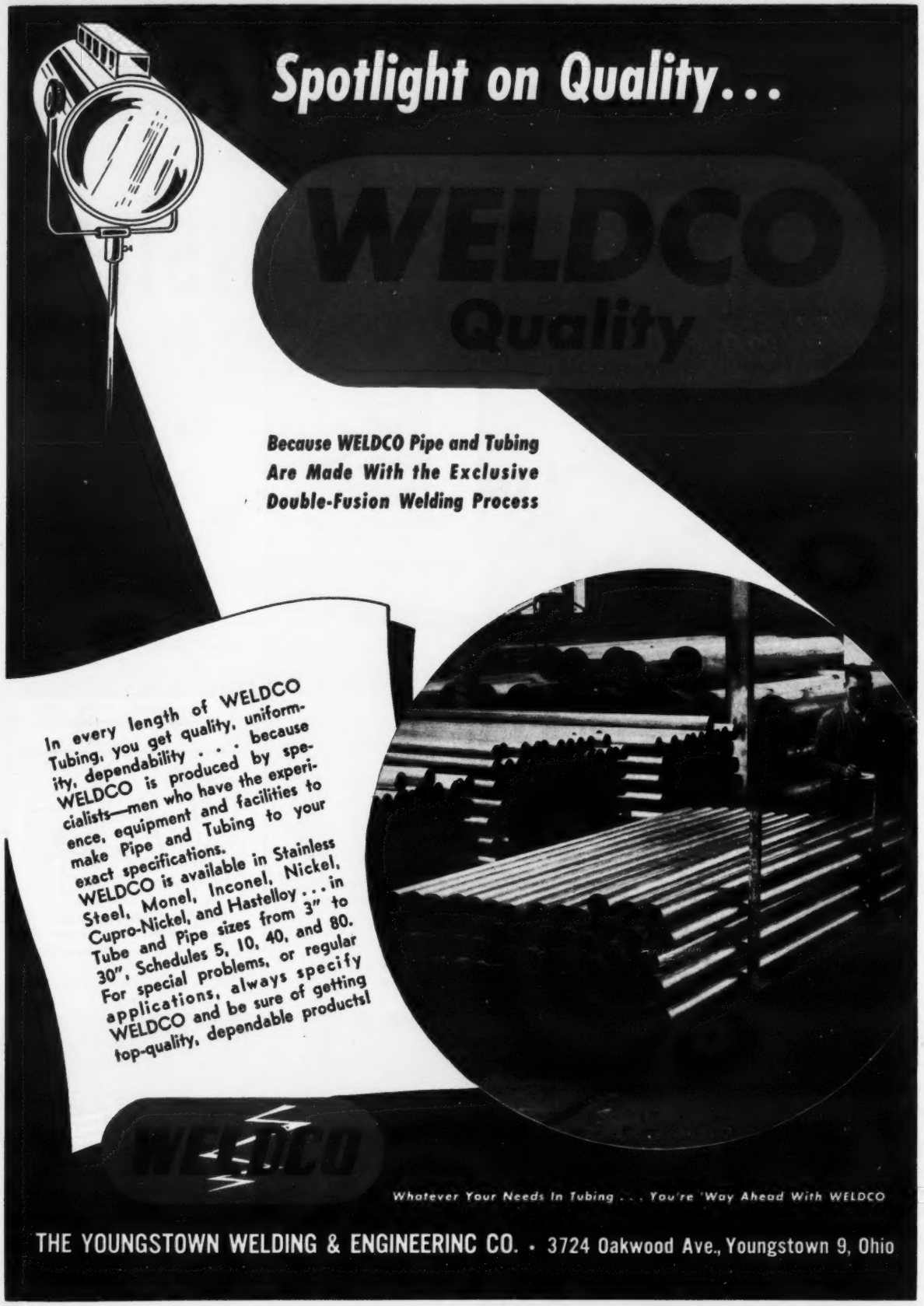
Name_____

Company_____

Address_____

City_____ Zone____ State_____

For more information on product at right, specify 5869 see information request blank opposite last page.


Spotlight on Quality...
WELDCO Quality
Because WELDCO Pipe and Tubing Are Made With the Exclusive Double-Fusion Welding Process
In every length of WELDCO Tubing, you get quality, uniformity, dependability . . . because WELDCO is produced by specialists—men who have the experience, equipment and facilities to make Pipe and Tubing to your exact specifications.
WELDCO is available in Stainless Steel, Monel, Inconel, Nickel, Cupro-Nickel, and Hastelloy . . . in Tube and Pipe sizes from 3" to 30", Schedules 5, 10, 40, and 80. For special problems, or regular applications, always specify WELDCO and be sure of getting top-quality, dependable products!
WELDCO
Whatever Your Needs In Tubing . . . You're 'Way Ahead With WELDCO
THE YOUNGSTOWN WELDING & ENGINEERINC CO. • 3724 Oakwood Ave., Youngstown 9, Ohio

When inquiring check 5870 opposite last page

Light aluminum vibrator ups vibratory power by 60%

Operates on about 75c/day

Uses: For freeing packed or bridged materials from hopper cars or storage bins.

Features: Unit is lightweight and easy to handle. It increases vibratory power 60% over conventional units. Operating costs are about 75c per day.

One man easily installs lightweight aluminum vibrator

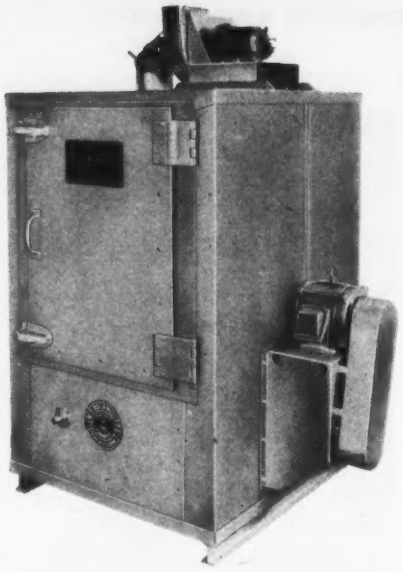
Description: Aluminum vibrator anvil is provided with flanged edges to quickly engage standard female mounting brackets. Convenient cast-in handle facilitates manipulation of vibrator in mounting. Micro-finish alloy sleeve cylinder prolongs operating life.

(Aluminum vibrator is product of Burgess Sterbentz Corp., Dept. CP, 3790 W. 150th St., Cleveland 11, O. . . . or for more information check 5871 on form which is located opposite last page.)

Lists brass fittings

All sizes and types of manufacturer's brass tube fittings are listed and illustrated in 48-page catalog. Instructions on right and wrong ways for tubing a system is included. Tube fittings catalog—The Weatherhead Co., Dept. CP, 128 W. Washington Blvd., Ft. Wayne, Ind. Check 5872.

for SAFE Drying of Hazardous or Delicate Materials



This recirculating steam-heated cabinet type, tray loading oven was designed for processing an explosive batch of fine crystals wet with methanol. Interior construction is all stainless steel, fume-tight; door latches and motors are explosion-proof; fans –spark-proof and corrosion-resistant.

Another example of Rockwell ovens for drying or curing process or finished materials at any required temperature, rate of heating, volume, weight and handling method.

What's your drying problem?

Rockwell ovens are available in standard bench, cabinet and truck loading types; gas, electric or steam. Also conveyor and special types.

W. S. ROCKWELL COMPANY

FURNACES • OVENS • BURNERS • VALVES • SPECIAL MACHINERY

2207 ELIOT STREET • FAIRFIELD, CONN.

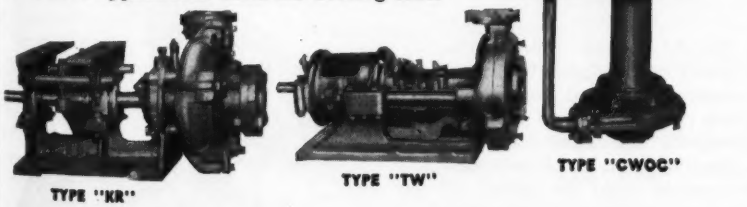
Sales Representatives in Principal Cities

When inquiring check 5873 opposite last page

THIS USER GOT THEIR NAGLE PUMPS *free!*

A large plant using several types of Nagle Pumps theoretically got them free, based on the cost of the replacements and repairs of the ordinary pumps they were using. Since installing Nagle Pumps there have been no replacements or repairs.

Nagle Horizontal Shaft and Vertical Shaft Pumps are designed for the tough, abusive jobs where ordinary pumps fail—jobs involving abrasion, corrosion or hot liquids. Types and sizes for every need—if it is an abusive application. Send for Catalog 5206.



TYPE "KR" TYPE "TW" TYPE "CWOC"

NAGLE PUMPS

NAGLE PUMPS, INC.

1247 CENTER AVE., CHICAGO HEIGHTS, ILL.

PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

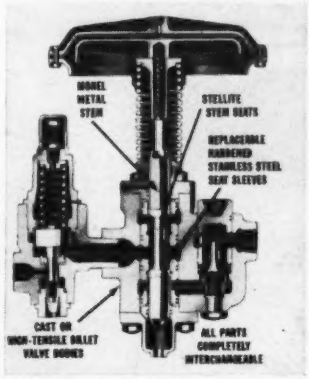
When inquiring check 5874 opposite last page

Diaphragm pressure valve gives long service

Uses: For automated control.

Features: Materials of construction assure long service life, ease of maintenance.

Description: Diaphragm-operated high pressure control valves, suitable for oil, air, steam, and hot or cold water service at pressures up to 6000 psi, have complete interchangeability of parts. Valve stem is of Monel metal and seat sleeves are constructed of hardened stainless steel. Valve body construction is of cast


MONEL METAL STEM
STELLITE STEM SEATS
REPLACEABLE HARDENED STAINLESS STEEL SEAT SLEEVES
CAST OR HIGH-TENSILE BILLET VALVE BODIES
ALL PARTS COMPLETELY INTERCHANGEABLE

High-pressure valve for automated control offers complete parts interchangeability

Navy M bronze or hi-tensile alloy billet bronze.

Stellite seats are electro-bonded to Monel stem, and stainless steel seat sleeves are easily replaceable. Line of ½ to 3" NPT medium pressure valves are also available.

(Diaphragm valves are product of Sinclair-Collins Valve Co., Dept. CP, 454 Morgan Ave., Akron 11, Ohio . . . or for more information check 5875 on form located opposite last page.)

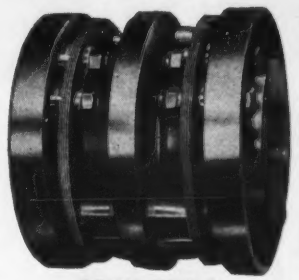
Polystyrene Insulation

Physical characteristics and construction of expanded polystyrene insulation material are presented in four-page bulletin. Polystyrene insulation bul — Mundet Cork Corp., Dept. CP, 7101 Tonnelle Ave., North Bergen, N.J. Check 5876.

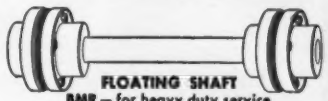
FOR MAINTENANCE FREE POWER TRANSMISSION

Specify

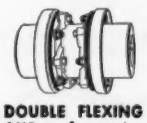
THOMAS FLEXIBLE COUPLINGS



DOUBLE FLEXING
DBZ — for high speed, heavy duty drives



FLOATING SHAFT
BMR — for heavy duty service with excessive misalignment



DOUBLE FLEXING
AMR — for engine and medium speed drives

SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog 51-A

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U. S. A.

When inquiring check 5877 opposite last page

investigate

Van-Cor

PIPE, FITTINGS, VALVES

Van-Cor is an unplasticized polyvinyl chloride that resists the corrosive action of hundreds of industrial acids and alkalis as well as sewage waste and brine. Van-Cor piping costs less, is lighter in weight, and easier to install than conventional pipe. It is readily formed, machined, threaded and welded. On many installations where metallic piping was eaten up *in a few months,* Van-Cor pipe has served *for years without deterioration.* Thus it quickly returns its cost and pays handsome dividends.

Van-Cor sheets are also fabricated into ducts, hoods, chemical tanks, fumestacks, etc.

INVESTIGATE!
Write for Bulletin, Specifications and Name of Nearest Distributor.

INDUSTRIAL DIVISION OF
COLONIAL PLASTICS MFG. CO.

SUBSIDIARY OF THE VAN DORN IRON WORKS CO.
2685 EAST 79th STREET • CLEVELAND 4, OHIO

When inquiring check 5878 opposite last page

One-inch Teflon diaphragm valve being installed on polio vaccine processing tank at Eli Lilly. Sterility and purity are insured by redesigned Teflon diaphragm

When processing test runs of polio vaccine at Eli Lilly & Co., showed high valve failure a crash program was initiated with valve manufacturer. Now, despite extreme temperature variations in process (5 to 150°C) . . .

redesigned solid Teflon diaphragm protects polio vaccine purity

Problem: Standard solid Teflon valve diaphragms could not withstand extreme operating conditions needed for manufacture of Salk polio vaccine at Eli Lilly & Co., Indianapolis, Ind. Even more important . . . sterility is an absolute necessity. Entire process must be sealed off from outside factors. No contamination of any kind is permitted.

Temperatures in manufacturing process range from 5° to 150°C with extended periods at lower temperatures and up to five hours at maximum. Major part of processing is carried out in portable tanks with diaphragm valves for throttling and shut-off. Actual manufacture requires 20

Thinner-than-standard Teflon diaphragm has greater flex-life, extended service life. Chemical inertness of Teflon is essential in preventing contamination of polio vaccine

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days, testing at least 110. During this time valves must provide an absolute seal. Diaphragm valves were chosen for this service because valve design permitted complete cleaning and sterilization with no danger of foreign contaminating material being trapped in valve and carried over into future batches.

Solid Teflon diaphragms were specified, when processing test runs began, because of their known heat resistance and chemical inertness. It was soon evident that standard Teflon diaphragms would not be satisfactory. Diaphragm failures after a few cycles were due primarily to flexing failure and extreme temperature variations. Before full production runs could begin, a diaphragm had to be found which had a longer predictable operating life. Thus, a valve change schedule could be set up with a safety margin so that all valve failures during production would be eliminated.

Solution: Because Teflon was only material which had proper chemical inertness and operating temperature range, redesign of diaphragm was considered best approach to obtaining desired operating life. Valve manufacturer worked closely with Lilly engineers, and Plastics Products Division of Raybestos-Manhattan, molder of the diaphragm, during Fall of 1955. New molding methods were worked out which gave better control of uniformity of dimension. Extensive testing showed that a diaphragm much thinner than former standard gave improved flex-life.

In a little over two months new design was evolved and tested. Sixty one-inch and 270 ½-inch valves were installed in the Lilly Polio Building used for manufacturing media and harvesting live virus.

Results: With these new diaphragms, valves began giving satisfactory service and program proceeded at top speed. Lilly replaces valves frequently, limiting number of cycles a diaphragm goes

Turn to next page

Leading firms specify SOLA-FLEX®

These 120 Sola-Flex Joints go into new ALCOA plant

MORE AND MORE LEADING FIRMS specify Sola-Flex industrial expansion joints to help solve difficult pressure and temperature problems. This shipment of bellows will be used in Aluminum Company of America's smelting plant at Point Comfort, Texas—and other volume orders are scheduled for petroleum, chemical, power and many other industries requiring durable, economical expansion assemblies.

Solar manufactures the most comprehensive line of bellows and expansion joints in the world. Types include convoluted, U-span, rectangular and custom-built joints for specific problems. Stainless steel and heat-resistant alloy bellows have been built for service from −320 F to 2000 F. And they have been supplied in sizes ranging from ½ inch to the world's largest—28 feet in diameter.

Hot or cold, large or small, high pressure or low—no matter what your particular piping need, experienced Solar engineers can recommend exactly the right expansion joint for you. Write today for the latest Sola-Flex catalog. Dept. D-73, Solar Aircraft Company, San Diego 12, California.

SOLAR AIRCRAFT COMPANY SAN DIEGO DES MOINES

DESIGNERS, DEVELOPERS AND MANUFACTURERS OF GAS TURBINES
EXPANSION JOINTS • CONTROLS • AIRCRAFT AND MISSILE COMPONENTS

When inquiring check 5879 opposite last page

STOP

PUMP

WEAR

Hard-face pump parts with the Colmonoy Spraywelder

Your pump plungers, pistons, rings, bushings—all your pump parts—will last longer with corrosion and abrasion resistant Colmonoy alloy hard-facing.

You apply these alloys fast—with the Colmonoy Spraywelder. This powder spraying unit produces smooth overlays, within .010" of desired size. They are welded to the base metal and require a minimum of finishing.

You'll save handsomely by either eliminating expensive corrosion resistant metal components, or by eliminating the time consuming hand application of hard-facing rod and the attendant difficulties in distortion and machining. Write today for more information on how you can use the Spraywelder.

HARD-FACING ALLOYS

WALL COLMONOY

BIRMINGHAM • BUFFALO • CHICAGO • HOUSTON • LOS ANGELES
MORRISVILLE, PA. • NEW YORK • PITTSBURGH • MONTREAL • GREAT BRITAIN

When inquiring check 5880 opposite last page

Teflon Valve

Starts on page 242

through to approximately 15. This is considered excellent in view of the temperature cycle the diaphragm must withstand. Because of longer predictable service life of diaphragms, danger of valve failure at a critical point in process has been eliminated. Close cooperation among engineers of Lilly, diaphragm molder, and valve manufacturer, enabled production of vaccine to proceed with a minimum of delay and still insure absolute purity.

(Valves and Teflon diaphragms are supplied by Hills-McCanna Co., Dept. CP, 3025 N. Western Ave., Chicago 18, Ill. Check 5881 on form opposite last page.)

(For more information on Teflon fabrication contact Plastic Products Div., Raybestos-Manhattan, Inc., Dept. CP, Manheim, Pa. . . . or check 5882 opposite last page.)

Versatile valves

Manufacturer's 8-page bulletins cover construction, features, and specifications of check and pump valve units. Forms 300 and 400—Durabla Mfg. Co., Dept. CP, 114 Liberty St., New York 6, N. Y. Check 5883.

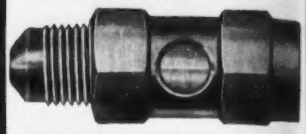
"Why can't you wait your turn in the shower just like everybody else."

Thanks to Joseph C. Dilts, E. I. DuPont DeNemours & Co., Inc., Wilmington, Delaware

MASS PRODUCTION COSTS TOO HIGH?

Here's the ideal low-cost indicator for those hard-to-get-at places.

NEW "237"
LIQUID EYE
Positive Sealing Indicator



(Illustrated 3/8" M. FL. x 3/8" FE. FL.)

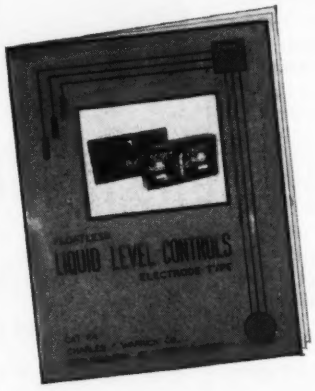
The new Allin "237" has all the proved Liquid Eye features plus:

- **smaller — more compact — dependable. (about 1/3'd smaller in the 3/8" male to female size than any previous unit).**
- **complete self-contained economy unit.**
- **new simplified design.**
- **available with 2 or 3 viewing ports.**

Custom units can be made to your exact specifications. Consult Allin engineers now.
Write today for full information and catalog covering complete Allin line.

Allin
ALLIN MANUFACTURING CO.
410 N. Hermitage Ave. • Chicago 22, Illinois
Over 1,000,000 Liquid Eyes Sold to Date

When inquiring check 5884 opposite last page



Write For 32 Page Catalog

- Pump Controls
- Duplex Pump Alternators
- High and Low Level Cutoffs
- High and Low Level Alarms
- Multi-level Signals
- Liquid Metering
- Special Controls and Panels

Listed by Underwriters Laboratories

CHARLES F. WARRICK CO.
1955 W. Eleven Mile Rd.
Berkley, Mich.

Warrick
FLOATLESS
LIQUID LEVEL CONTROLS
ELECTRODE TYPE

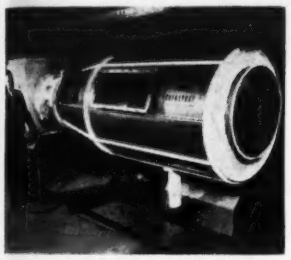
When inquiring check 5885 opposite last page

Develop air conditioner that is self-cleaning, compact, low cost

Uses: For large industrial areas.

Features: Unit occupies only one-third space of conventional equipment. Because it is self-cleaning, it effects major cost reduction by eliminating many man-hours required to clean conventional systems.

Description: Expected to make conventional industrial air conditioning equipment obsolete, according to manufacturer, device will handle much greater volume of air for its size at higher velocities than is possible with currently available units. "Spin-dry" principle removes water droplets, lint, and other foreign matter. Rotating eliminator will operate at air velocities up to 2400 fpm.



Air conditioner requires only one-third space of conventional equipment and virtually eliminates cleaning and maintenance

(Rotaspray Weathermaker is product of Carrier Corporation, Dept. CP, Syracuse 1, N.Y. . . . or for more information check 5886 on form opposite last page.)

Uranium processing tanks protected from freezing by glass overcoat

Insulation is unaffected by acid drippage

Problem: Protecting acid processing solutions from freezing, and guarding tanks against damage from acid drippage, were essential precautions to be taken at Quirke and Nordic uranium mines

Now! Automatic Quantity Control for Corrosive Liquids

"On the nose" measurement with smooth multi-stage shut-off

This efficient, Rockwell *stainless steel* meter-control system will save money for you who batch, blend or otherwise process foods, pharmaceuticals, chemicals, liquors, etc. It's immune to corrosive attack!

To operate you simply pre-set the quantity you wish to measure on the register. When this quantity has been reached, the flow stops. The automatic control valve is of the multi-stage type so the shut-off is made without hydraulic shock. Simple electrical controls are available for repetitive operation.

Rockwell also makes this automatic quantity control unit in bronze, steel or all-iron construction. Use the handy coupon for full details.

Rockwell

STAINLESS STEEL METERS

with quantity control valve

CLIP COUPON—MAIL TODAY

ROCKWELL MANUFACTURING COMPANY Dept. 106J
Pittsburgh 8, Pennsylvania

Gentlemen:

I am interested in measuring _____ (Name of liquid)

Pipe Size _____"

Working Pressure _____ psi. Temperature _____ °F max.

Max. Flow Rate _____ gpm. Min. Flow Rate _____ gpm.

Your Name _____

Company _____

Street _____

City _____ Zone _____ State _____

When inquiring check 5887 opposite last page

DAY "AC" Dust Filter and DAY Dual-Clone in the Stauffer Chemical Company fertilizer plant located in Tacoma, Washington

THIS DAY DUST CONTROL EQUIPMENT CERTAINLY SOLVED OUR DUST PROBLEM!

DAY Supplies Dust Control Equipment for Practically Any Industrial Need

The DAY "AC" dust filter* (shown above) captures submicron particles with 99.99+% filtering efficiency. This filter is used in many plants throughout the United States and Canada and handles a wide variety of materials including aluminum, cement, chemical, food, pharmaceutical, porcelain, radioactive, rubber and many other dusts.

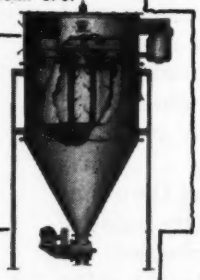
The DAY Dual-Clone (above-right) has low horsepower requirements and operates with unusually low back pressure. It requires no maintenance.

For latest information about DAY "AC" and Dual-Clone equipment write toDAY for Bulletins 559 and 49-DC.

*Licensed by H. J. Hersey, Jr.

DAY TYPE "HV" CYCLONIC SEPARATOR

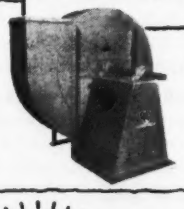
A heavy gauge, welded, high efficiency cyclonic separator. The DAY "HV" has a wide range of applications. It handles abrasive or high temperature dust laden air and requires no maintenance because it has no moving parts. Available for pressure or vacuum operation. For additional information write for Bulletin 576.



DAY TYPE "RJ" DUST FILTER*

A packaged dust filter shipped completely assembled and ready to run. Provides high performance, top efficiency dust control at low cost. High air-to-cloth ratios give extra air handling capacity in small area. Furnished with or without dust fan and discharge equipment. For latest information write toDAY for Bulletin 560.

*Hersey and DAY patents applied for.



DAY TYPE "G" EXHAUST FANS

High air delivery per horsepower required. These fans are designed specifically for dust control applications. Each fan is statically and dynamically balanced before shipment. For further information write toDAY for Bulletin 471.

DAY SINCE 1881

The DAY Company

DAY SINCE 1881

SOLD in UNITED STATES by
The DAY SALES Company
852 Third Ave. N.E., Minneapolis 13, Minn.

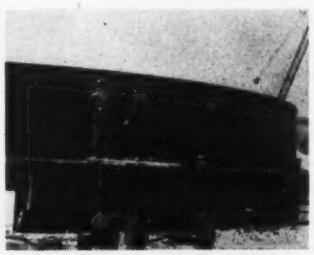
MADE and SOLD in CANADA by
The DAY Company of Canada, Ltd.
P.O. Box 707Y, Fort William, Ontario

Representatives in Principal Cities

STOP AIR POLLUTION with DAY DUST CONTROL

When inquiring check 5888 opposite last page

and processing plants of Algom Uranium Mines Limited, Rio Tinto Mining Company operation in Canada's Blind River area. Each plant is geared to process 3000 tons of uranium ore daily and operate 24 hours a day. Uranium is dissolved from ore by chemical process. After uranium has been dissolved and put into solution, the ore and uranium bearing solution are passed through huge separating tanks filled with sulphuric acid solution. These tanks, constructed of mild steel and rubber-lined on the inside, are much too large to be built indoors. Yet they must function during severe Canadian winters when temperatures may range well



Cellular glass block insulation protects huge uranium process-tank from sub-zero weather and acid damage

below zero for weeks. It is essential that the sulfuric acid solution does not freeze. Nitric acid, used in another part of the process and stored in stainless steel tanks, must also be prevented from freezing.

Solution: Cellular glass blocks were adhered to tank surface with hot asphalt. Mastic finish was then troweled on and glass fabric embedded in it.

Results: Installation has met requirements of protecting processing solutions from freezing and guarding exterior of tanks against damage from acid drippage. Fire-proof quality of material provided an additional safety factor.

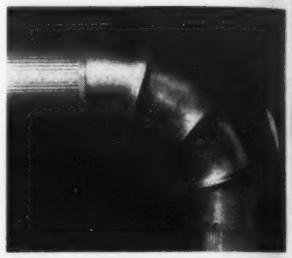
(Foamglas insulation is product of Pittsburgh Corning Corp., Dept. CP, One Gateway Center, Pittsburgh 22, Pa. . . . or for more information check 5889 on the convenient Reader Service slip which is located opposite last page.)

Aluminum jackets protect elbows, cut repairs

No special tools required for two-piece ells

Uses: For protecting insulated elbows.

Features: Two-piece jackets fit snugly over insulated elbow giving positive weather-tight protection. No special tools are required. Frequent and costly repairs occurring with conventional weather-proofing are eliminated.



Two-piece aluminum jackets give positive weather-tight protection

Description: Jackets are deep-drawn from 0.020" aluminum, #3003 alloy. They are manufactured for both 45° and 90° ells, and have factory-applied moisture barrier.

(Aluminum Ell-Jackets are product of Childers Mfg. Co., Dept. CP, PO Box 7467, Houston 8, Texas . . . or check 5890 opposite last page.)

Welded-tube condenser, automatic welder — to meet trend

Condenser is tubed on job

After conducting hundreds of welding tests with over 100 different combinations of tubes and sheet alloys over period of several years, company has developed welded tube condenser. Development work was carried out to meet trend toward higher pressures, once-through boilers, and nuclear plants requiring positively pure water.

In connection with this work, company has also developed an automatic welding

Automatic gun welds tubes into tube sheets for surface condenser

device, all welding being done with tungsten inert gas welding process. To prevent tube sheet distortion, circular pits or grooves are cut in tube sheet around each tube hole. This leaves a collar around the hole about as thick as tube itself.

Technique reduces current required for welding and corresponding amount of heat generated.

A neat doughnut of metal fused from tube and collar results. First welded tube condenser, 90,000-sq ft, single-pass unit, will be tubed on the job with automatic welding device.

(Welded-tube condenser is development of Allis-Chalmers Mfg. Co., Dept. CP, Milwaukee 1, Wis. Check 5891 on form which is located opposite last page.)

Sub-zero ethylene gas handled by steel alloy pipe and valves

Special lubricant developed to reduce friction

Problem: Pipe and valves capable of handling sub-zero temperature ethylene gas were needed at Hercules Powder Company plant, located 20 miles from Linden, N.J. Ethylene gas was sent through pipeline at 600 psi from Esso Refinery at Linden.

When ethylene reached meter and regulator station at Hercules, it was reduced in pressure for convenient handling in polyethylene conversion.

This reduction caused sub-

One of a series.

An Inside Peek at Steam Trap Capacity Ratings

or . . . how to be sure steam heated equipment is going to work the way it's engineered

When you get all through engineering a steam heated process equipment installation, its performance will depend on whether your steam traps will do what the catalog said.

Now, in theory, if you know the size of a steam trap orifice, you can figure how much water can be pushed through it in a given time by a given steam pressure. But, in practice, this doesn't work out. The picture is scrambled by things like the choking effect of flash steam and restriction of flow through the trap and piping.

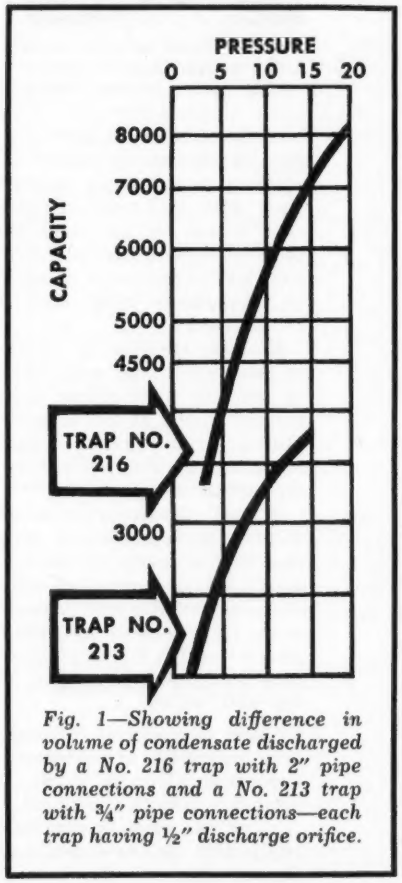


Fig. 1—Showing difference in volume of condensate discharged by a No. 216 trap with 2" pipe connections and a No. 213 trap with ¾" pipe connections—each trap having ½" discharge orifice.

For example, Fig. 1 shows that a ½" orifice in a 125 psi No. 216 Armstrong steam trap with 2" pipe connections will discharge 7200 lb/hr condensate at 15 psi inlet pressure. Yet, a ½" orifice in a 15 psi No. 213 trap with ¾" pipe connections, discharges but 3900 lb/hr at 15 psi inlet pressure. The difference: pipe friction.

Thus, we see a need for investigating the basis for steam trap capacity ratings. Unfortunately, they are not all arrived at in the same way. If they are based on cold water tests, producing no flash steam, they are much too high. Orifice tests are also too high because they ignore pipe friction. Calculations involving flow-through-orifice formulae have never been known to be conservative insofar as traps are concerned.

Armstrong Ratings

Armstrong trap capacity ratings are based on actual operating conditions, determined by hundreds of tests. In these tests condensate at the steam temperature corresponding to test pressure was used. Restriction of flow caused by the choking effect of flash steam, as well as the back pressure created by flash steam and condensate, automatically were taken into account. Actual installation hookups were used, so that pipe friction in both inlet and discharge lines also was reflected in the results.

All this effort assures you the nice, comfortable feeling that comes from knowing a trap will deliver on the job the full capacity claimed in the catalog.

* * *

There is one more ingredient that needs to be tossed into the trap-sizing pot. This morsel is the safety factor—the required excess of trap capacity over calculated condensate load. It will be the subject of the next advertisement in this series. But, in the meantime, if you'd like to get the lowdown, ask for a copy of the 44-page Armstrong Steam Trap Book. It is a complete guide to good trapping practice. It covers not only safety factors, but calculation of condensate loads and trap selection, installation, troubleshooting and maintenance. Just call your local Armstrong Factory Representative, or write: **Armstrong Machine Works, 8305 Maple St., Three Rivers, Michigan.**

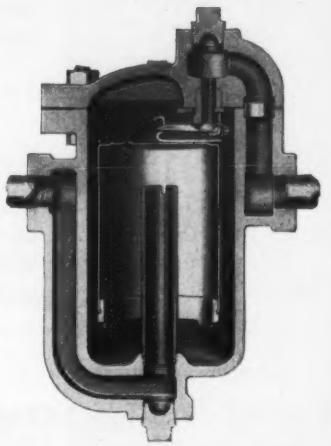


Fig. 2—Armstrong inverted bucket steam trap—hardened chrome steel valve and seat—stainless steel lever and bucket—simple, dependable, long-lived.

ARMSTRONG STEAM TRAPS

When inquiring check 5892 opposite last page

pumping something special?	check these special features available with Yeomans Vertical Wet Pit Centrifugal Pumps*
sand glass particles and other abrasives	*Lubri-Vac*® reduces by 95% the failure of bearings due to scoring by abrasive particles. Lubri-Vac constantly flushes bearings with lubricant, keeps foreign matter away. (An exclusive Yeomans feature included on all heavy-duty pumps.)
ash fly ash cinders bits of coal corn foots and other solids contained in drainage	A cradle pump with protective sleeves to protect shaft. Special manganese steel parts. Yeomans pumps including these features will give long life under the most severe abrasive conditions.
potassium cyanide sulphuric acid jet fuel melted naphthalene and other toxic or volatile liquids	Shaft seal is not under liquid pressure with Yeomans Vertical Wet Pit Pumps. This feature eliminates the leakage hazard which is present with horizontal pumps.
molten phosphorous acetic acid hydrochloric acid black liquor and other corrosive liquids	Whatever the corrosive and/or abrasive liquid to be pumped—Yeomans has special ferrous and non-ferrous alloy parts to handle it.

*Vertical Wet Pit Centrifugal Pumps save floor space, require no priming —no costly liquid leaks as stuffing boxes are not under liquid pressure. Capacity range from 5 g.p.m. to 10,000 g.p.m.

YEOMANS

2003-5 NORTH RUBY STREET, MELROSE PARK, ILLINOIS

☐ Please send me the catalog, "Yeomans Heavy-Duty Wet Pit Pumps."

☐ I wish to know how I may see Yeomans' 15 minute film on Wet Pit Pumps.

Name_____

Company_____

Street_____

City_____ Zone_____ State_____

When inquiring check 5893 opposite last page

zero temperature drop of ethylene, dictating use of pipe and valves that would retain strength and serviceability despite extreme cold.

Solution: Lubricated plug valves of nickel-steel and pipe of stainless steel were installed. Valves were cast steel alloyed with 3½% nickel. Each valve combined thrust ball-bearing housing and sealed stuffing box in compact unit.

Ball-bearing unit accurately controlled upward thrusts of plug caused by line and lubricant pressures.

Valve lubricant facilitates operation, protects against corrosion, seals against ethylene leakage

Leakage along plug stem was prevented by plastic in stuffing box bearing against stem with just enough pressure to seal but not hindering plug movement. Special lubricant was compounded to serve in temperature range created by ethylene.

Results: Because of ability of steel alloy pipe and valves to gain strength rather than become brittle at low temperatures, proper service performance of meter and regulator station was assured.

Special lubricant reduced friction in operation of plug and kept it ready for service. Lubricant also provided tight seal against ethylene leakage with valve closed by filling grooves which frame ports of plug and encircling plug at top and bottom.

(Valves and special lubricant are products of Walworth Company, Dept. CP, 60 E. 42nd St., New York 17, N.Y. . . . or for more information check 5894 on the convenient Reader Service slip located opposite last page.)

Welding electrodes, fluxes

Folder of six pages contains condensed data on specialty electrodes and fluxes for welding, brazing, soldering, cutting, and tinning of metals. Cat folder F-121856 — All-State Welding Alloys Co., Inc., Dept. CP, 249-55 Ferris Ave., White Plains, N.Y. Check 5895.

Toughness, flexibility permit easy handling of gasketing fiber

Has no loose material to clog or contaminate system

Uses: For insulating and gasketing applications where sharp bending or unusual compression is a factor.

Features: Built-in toughness and flexibility of material permit easy handling. Clean die-cutting operations are possible since there are no loose fibers to become detached to contaminate fluids or clog orifices.

Description: Asbestos fibers are refined to eliminate all lumps and bunches of fibers. Fibers are then coated uniformly with rubber binder by

Gasketing withstands sharp bending, unusual compression

patented "beater-saturation" process. Special saturants are added to water slurry before composition is formed. In test installations, material showed perfect sealing performance with minimum bolt torque

loss where flange temperatures are up to 500°F and internal liquid pressures are up to 500 psi.

("Accopac" is product of Industrial Div., Armstrong Cork Company, Dept. CP, Lancaster, Pa. . . . or for more information check 5896 on form opposite last page.)

Molybdenum tube available for high-temperature applications

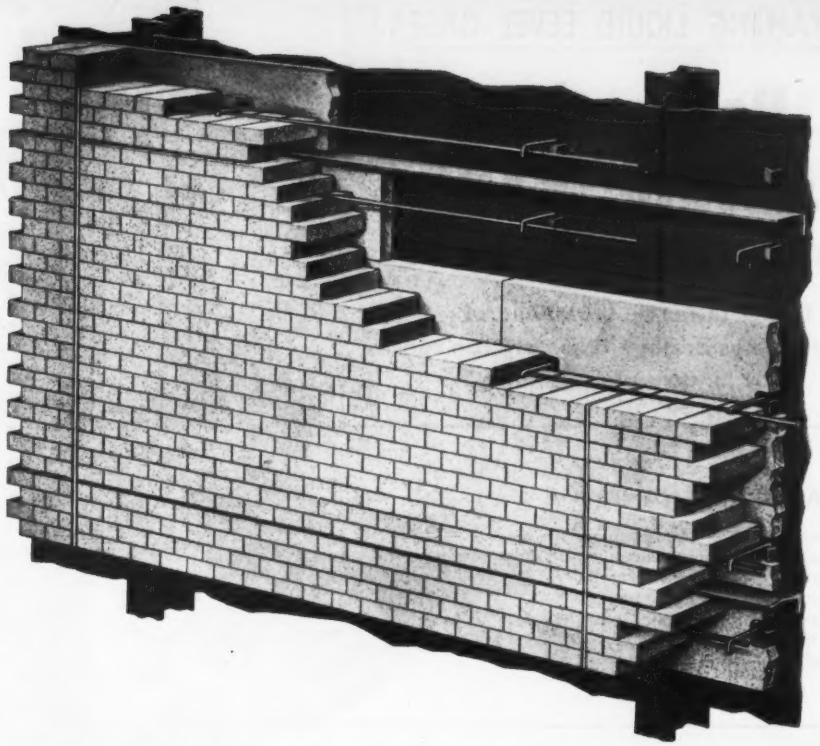
Successful commercial extrusion of molybdenum metal — particularly suited for nuclear power plants, jet engines, rockets, and missiles, and high-temperature applications has been achieved with a new process. In the past, high strength of the material at extrusion temperatures had been a barrier to commercial extrusion. Molybdenum, which is stronger than any other known metallic material at temperatures in excess of 1700°F, also resists corrosion by liquid metals.

Tube manufacturer can now make extruded molybdenum tubing available for evaluation purposes. Tube dimensions are: less than 1" outside diameter; approximately 0.1" wall thickness; and 3 to 6' in length. Tensile strength is 70,000 to 100,000 psi, and yield strength is 60,000 to 90,000 psi.

(For further information on extruded molybdenum, developed in cooperation with Climax Molybdenum Company, contact Wolverine Tube, Div. of Calumet & Hecla, Inc., Dept. CP, 1411 Central Ave., Detroit 9, Mich. . . . or check 5897 opposite last page.)

Heating device info

Power requirements section of 16 pages, showing short and long form calculations for heating applications, is included in 72-page catalog on heaters and heating devices. Bul GEC-1005H — General Electric Company, Dept. CP, Schenectady 5, N.Y. Check 5898.



B&W Insulating Firebrick sectionally supported wall construction, horizontal rod-type anchoring

Can this construction cut your costs?

Simplified design and lower material costs in initial construction, ease of installation and maintenance, reduced downtime and economy of operation—these are the benefits of this *lightweight* insulating firebrick construction.

Here's what lightweight means. Compared with dense fireclay refractory materials that weigh from 125 to 140 lb per cu ft, lightweight insulating firebrick weigh approximately 26 lb per cu ft for B&W's 2000 degree brick. This difference provides two major advantages: (1) mechanical, which largely affects design and construction, and (2) thermal, which saves in maintenance, downtime and operation.

Savings in design and construction

The use of lightweight IFB simplifies engineering requirements and reduces costs. A minimum of detailing is needed, since the design is engineered around one standard shape — a feature of B&W IFB constructions.

Material requirements are simplified, too. B&W IFB can be tailor-cut, drilled or shaped as necessary, eliminating the need for costly special fired shapes, and the delays in obtaining them. Typical sections, such as burner openings, observation ports and tube supports, can be cut and shaped on the job in minutes, using ordinary woodworking tools.

Substantial savings are possible in structural steel, since insulating firebrick roof and wall constructions are lighter. In locations with soil of poor load bearing capacities, this lightweight may also result in reduced foundation costs.

These savings, coupled with B&W's engineering and service facilities available during the design phase, mean lower initial costs.

Savings in maintenance, downtime and operation

Lightweight IFB offer a major thermal benefit—they store and conduct less heat. Heavy refractories retain heat; in the event of forced shutdown, they can cause burn-out of expensive alloy tubes, where used. The low quantity of heat stored by B&W IFB can be quickly dissipated, thus protecting these expensive tubes.

Further, this low heat storage permits faster heating and cooling. This means quicker access to the furnace in the event of emergency shutdown. Your maintenance crew can get in the furnace sooner and get it back on stream faster.

Supplied from nearby warehouses

With the use of simplified IFB constructions, refractory repairs can be quickly and easily accomplished with standard shapes from a nearby warehouse. This eliminates costly delays in obtaining special shapes.

Anchoring devices, too, are simplified. Since there are no expensive special castings in B&W IFB constructions, carbon steel or low alloy rods can be used. These are generally available from any local steel warehouse.

Increased efficiency

Generally, the lighter a firebrick the better an insulator it is. Since B&W IFB are the lightest insulating firebrick made, they are the most efficient insulators. Per inch of thickness, B&W IFB provide more insulation than any other refractory material. The result is that for walls of equivalent thickness less heat is lost with B&W IFB. Casing temperatures are lower, thus improving working conditions. This means increased efficiency and reduced operating costs.

R 838

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

When inquiring check 5899 opposite last page

INSTALLING LIQUID LEVEL GAGES

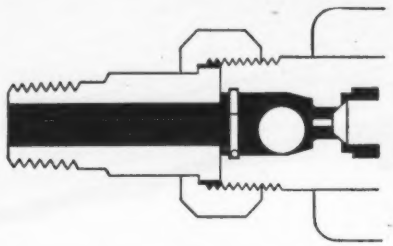
Penberthy "FLOATING SHANK"

lines up off-center holes

Center-to-center variations of vessel tappings or gage assembly can cause costly, inaccurate mounting.

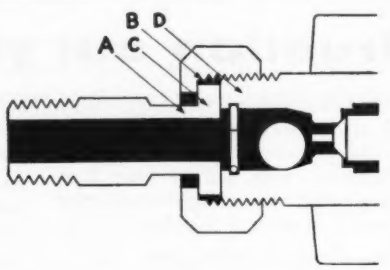
STANDARD SHANK

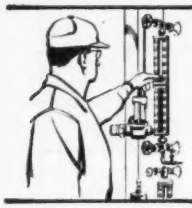
Minimum tolerance between union nut, nipple, and nipple flange prevents *any* corrective movement to compensate for inaccurate tapping. Gage and valve assemblies must either be "force-fitted" or vessel retapped.



FLOATING SHANK

Recessed neck (a) plus wide union opening (b) permit 3/16" movement of flange (c) in ANY direction. Together, "floating shanks" on top and bottom gage valves compensate for off-center tapping errors as high as 3/8". Ground flange (c) assures TIGHT metal-to-metal union with valve body (d).





...eliminates mounting strains

By permitting freedom of movement up to 3/8" in ANY direction, Penberthy "floating shank" principle protects against mounting stresses . . . allows gage and valve assemblies to seek TRUE center-to-center position between inaccurately tapped holes.

AN EXCLUSIVE EXTRA AT NO EXTRA COST

- cuts installation time and replacement costs by 50%
- provides true gage and valve alignment on incorrectly tapped vessels
- eliminates "force-fitting" and subsequent strains on gage and valve assemblies
- prevents possible damage to entire installation
- reduces unnecessary glass breakage due to gage distortion

WRITE for Catalog 36 showing complete line of liquid level gages and valves, Standard or special assemblies available through local suppliers or direct.

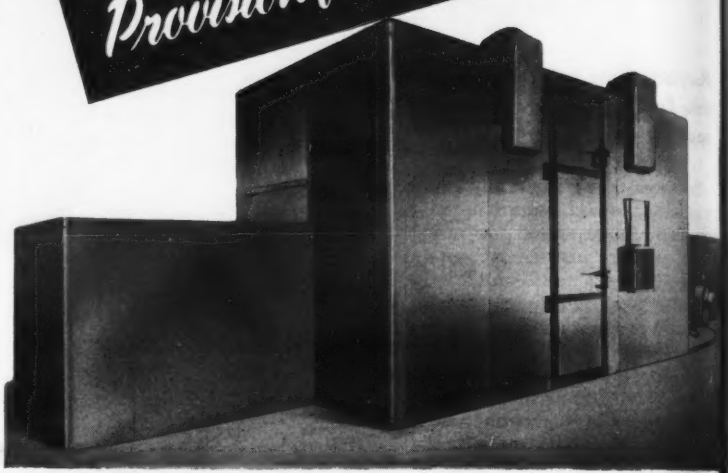
PENBERTHY MANUFACTURING COMPANY *Division of Buffalo-Eclipse Corporation*
Dept. CP 1242 Holden Avenue Detroit 2, Michigan

Everywhere . . . you're seeing more
PRODUCTS BY PENBERTHY

EJECTORS
INJECTORS
CYCLING JET PUMPS
LIQUID LEVEL GAGES
GAGE VALVES
SUMP PUMPS

When inquiring check 5900 opposite last page

This Small Dryer Has Everything . . . Including Provision for Expansion



"NATIONAL" APRON CONVEYOR DRYE

While this comparatively small Apron Conveyor Dryer was installed to immediately provide pilot plant production, it is readily adaptable to expansion to meet future large-scale production requirements. It incorporates all the features available in the largest "National" Dryers of this type, including the following:

The most efficient air control devices, to assure absolute uniformity of air distribution and condition through the material.

Wide flexibility in air delivery by use of adjustable pitch fans.

Adjustable sealing of air to eliminate leakage and dust carry-over to chain and other parts of equipment.

Newest heavy-duty trussed-type apron hinges.

Latest devices for chain alignment control and lubrication.

Send for Folder Describing "National" Single and Multiple Apron Conveyor Dryers and Related Equipment

THE DRYING MACHINERY COMPAN
LEHIGH AVE. and HANCOCK ST., PHILADELPHIA 33, PA.

England Agent: JONES & HUNT, INC., Gloucester, Mass.
Cable Address: "NADRYMA"—W. U. Code

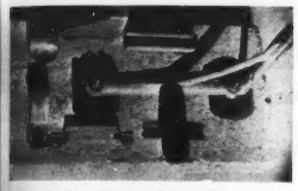
When inquiring check 5901 opposite last page

Steel, epoxy-resin alloy provides strong bonding to concrete

Uses: For fastening conduit, piping, shelving, brackets, wood, insulating and other materials to concrete without special tools or drilling.

Features: Joint formed is unaffected by heat, moisture, and most chemicals. No heating or solvent-evaporation is required for complete cure. Careful measuring of components is not necessary.

Description: Since consistency of micronized steel and



Single bracket, with bonding material properly applied, will support several hundred pounds

epoxy-resin alloy is putty-like, very rough surfaces can be joined. Material comes in tube form. It is used alone for small repairs. To cover large open areas, it can be reinforced with glass fiber or any other material that will hold it in place while curing. Material is available in 5-ounce tubes and in larger containers.

(Steelpatch is product of The Lockrey Company, Dept. CP, Southampton, N.Y. . . . or for more information check 5902 on form opposite last page.)

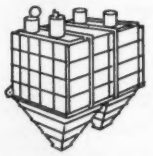
Teflon valve sleeve eliminates need for lubrication

Permits free turning of plug under all conditions

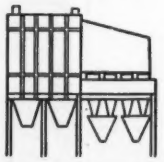
Uses: For liquid and gaseous corrosives; solvent and slurry services; or for hydraulic and pneumatic services where standard valves will not seat owing to mechanical interference from entrained solids, polymerization, crystalline deposits, or

Pay dirt!
. . . year after year!

BUELL CYCLONE



"BF" ELECTRIC PRECIPITATOR



PRECIPITATOR-CYCLONE COMBINATION

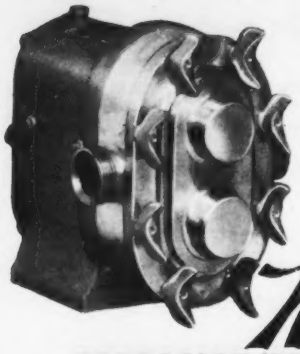
Buell Cyclone collectors pay off two ways: extra efficiency from the start . . . and extra years of operation, with little if any maintenance. Unique features like Buell's exclusive Shave-off deliver an extra percentage of dust collection efficiency: in nearly all cases, Buell installations pay for themselves in just a few years. And heavy plate construction, scientific proportioning, side entry of dust-laden gases are reasons why they keep on earning for many, many years. For specific details, write for "The Collection and Recovery of Industrial Dusts". Just write Dept. 11-I, Buell Engineering Company, Inc., 70 Pine Street, New York 5, New York.

buell

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

When inquiring check 5903 opposite last page

CHEMICAL PROCESSORS!



Check this list of Design Benefits in

Waukesha

CORROSION RESISTANT PUMPS

. . . then clip and file

You don't have to guess the performance and engineering benefits you get in a Corrosion Resistant Pump. The most important are listed in the left hand column. But *do* check the benefits offered by other pumps. And when you add up the blank spaces in the right hand column — you'll buy WAUKESHA!

WAUKESHA	OTHER
Perfect O-Ring sealing against product leakage or air intake *without* troublesome packing glands.	
Only corrosion-resistant non-abrasive *metal* impellors.	
Stainless steel positive drive shaft sleeve to save costly shaft wear.	
No small radius corners, short diameter grooves or dirt collecting, product contaminating corners.	
NO MATERIAL other than non-contaminating metal in contact with the product.	
A pump that meets 3-A Standards and the approval of the U. S. Public Health Service.	
A pump that provides side mounting.	
A pump that provides a vented cover to protect personnel and equipment against back pressure accidents.	

How is the score? WAUKESHA's ahead?

The features listed are but a few of the many you'll find in the new Corrosion Resistant Pump. They are all described and illustrated in the WAUKESHA Catalog — yours on request. Just send a postcard for Bulletin 1957.

ONLY Waukesha gives you a quarter century's experience and reliability

Waukesha FOUNDRY COMPANY

Dept. P-9, Waukesha, Wisconsin

When inquiring check 5904 opposite last page

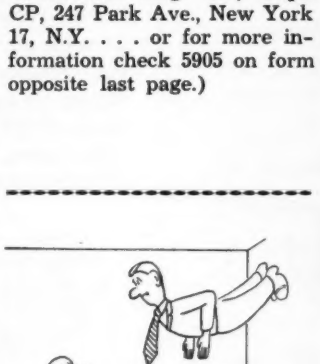
heavy slurries.

Features: Teflon sleeve eliminates need for any lubrication. Internal ribbed construction locks sleeve in position for high-pressure continuous sealing around body ports and bore, yet permits sleeve expansion and contraction without leakage.

Description: Low-friction Teflon sleeve of valve permits free turning of plug under all operating conditions. Plug rotation is limited to ¼ turn by stops in valve cover. Fully enclosed metal construction, shield-type epoxy-coated wrench, unexposed Teflon, and four-bolted cover provide maximum protection against fire or line shock.

Absence of any lubrication prevents stream contamination, and sleeve wiping action keeps plug free of adhering solids or liquids. Valve will operate continuously at temperatures from −150 to 400°F, and under pressures from 230 psi to high vacuum. Valve meets MSS-SP42 specifications; flange and wall thicknesses meet ASA standards.

(Tufline valve is product of Continental Mfg. Co., Dept. CP, 247 Park Ave., New York 17, N.Y. . . . or for more information check 5905 on form opposite last page.)



"I don't care what you've discovered, Rockwell. It doesn't produce aluminum."

Thanks to Walter L. Boyden, Kaiser Aluminum & Chemical Co., Tacoma, Washington.

You can save time, space, & labor

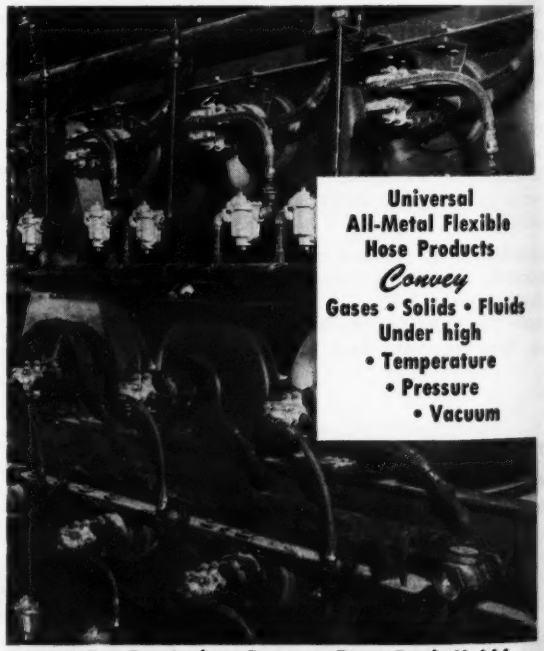
by Filtering, Mixing, Storing

WITH OUR UNITS

Write Today For Our New 40 Page Liquid Processing Catalog

ALSOP ENGINEERING CORPORATION
1209 Alsop Square, Millidale, Connecticut

When inquiring check 5906 opposite last page



Universal All-Metal Flexible Hose Products *Convey* Gases • Solids • Fluids Under high • Temperature • Pressure • Vacuum

For Particulars Request Data Book U-444

Quality . . . ALL METAL FLEXIBLE HOSE PRODUCTS

UNIVERSAL METAL HOSE CO.

2189 South Kedzie Avenue, Chicago 23, Illinois

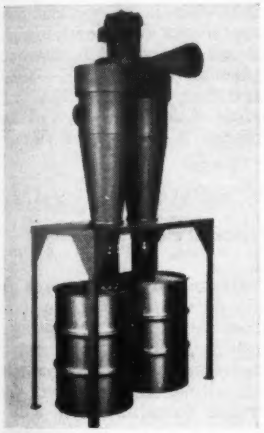
When inquiring check 5907 opposite last page

An air-tight drum cover permits 30 sec change on dust collector

Uses standard 55-gal drums; no need for clamps

Uses: For trapping large volumes of bulky dust from the air.

Features: Unit has been fitted with connections to standard 55-gal drums. Automatic air-tight sealing cover, eliminating need for clamps, permits drum changing in 30 seconds.



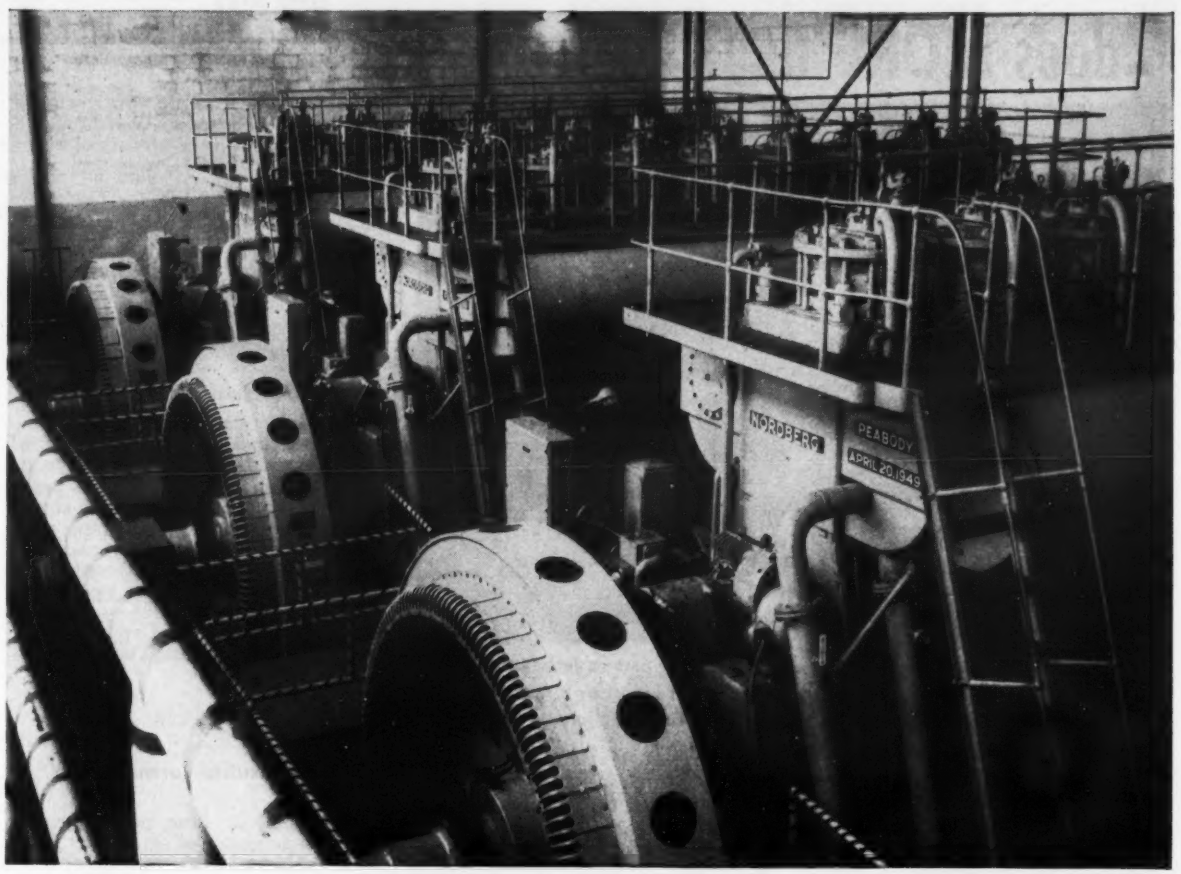
Air-tight sealing drum cover of dust collector permits drum changing in about 30 seconds

Description: Centrifugal force in cyclone dust collector precipitates all but very finest particles into drum. Three after-filter bags, with which unit is equipped, trap remaining fine particles. Powered by 5-hp, 3450-rpm motor, collector pulls 2000 cu ft of air per minute through its 8″ inlet at static pressure of 28″ (water) and an air speed of more than one mile per minute.

Dimensions of unit are 104-inch height, 32-inch width, 32-inch depth, 10-inch outlet diameter, and 700-pound shipping weight.

(Model 219-FB-55 dust collector is product of Torit Mfg. Co., Dept. CP, 287 Walnut St., St. Paul 2, Minn. . . . or for more information check 5908 on the convenient Reader Service slip which is located opposite last page.)

Look to COOK for Better Rings!

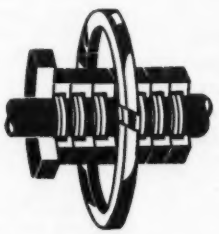


Peabody, Mass. Electric Company Swears by Cook Piston Rings!

Better Performance Since Installation of Cook Rings!

All three of Peabody Electric Company's 3200 H.P. Diesel engines are shown here. In 1956 these engines were required to operate 11,375 hours and generated 19,609,100 kilowatt hours. All three were equipped with Cook Piston Rings and gave trouble-free performance throughout the year.

This record is a tribute to Peabody's excellent management and operating personnel — *and* to the outstanding quality of Cook Piston Rings. If you're looking for a seal with the savings built in, write direct for product information and the name of your nearest representative. Address: C. Lee Cook Company, 932 South 8th Street, Louisville 3, Kentucky.



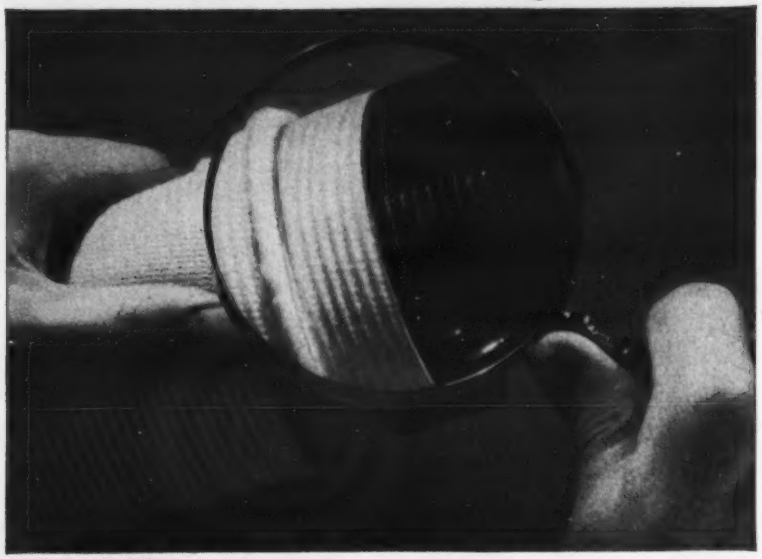
C. LEE COOK COMPANY

Division of Dover Corporation

Rings and Packings Since 1888

When inquiring check 5909 opposite last page

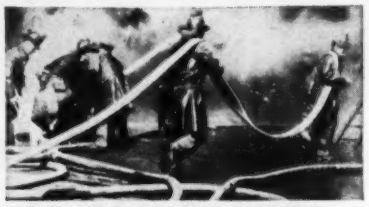
Pictures tell why PETROCHEM does MORE than fight fire



IT'S RUGGED . . . stands up to abrasion, resists weather. PETROCHEM'S oil-resistant Neoprene tube is enclosed in a tough, wear-defying Dacron* jacket. It's a rugged, light, flexible fire hose that wears and wears.

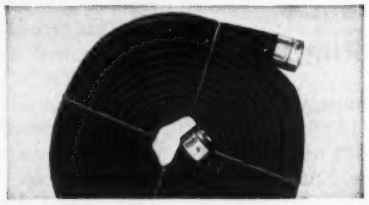
*Reg. T.M. E.I. Dupont de Nemours & Co.

IT'S STRONG . . . strong enough to withstand 500 lbs. pressure and 300°F. temperature.



IT'S OIL AND CHEMICAL RESISTANT . . . fights off deterioration both inside and out.

IT'S FLEXIBLE . . . so flexible it takes tight twists without injury.



IT'S EASILY COILED . . . requires a minimum of storage space.

These are the reasons why it will pay you to consider PETROCHEM fire hose in your safety planning. Your Quaker-Quaker Pioneer distributor provides extra-fast service. See him today. For more information, please write to: *H.K. Porter Company, Inc., Quaker Rubber Division, Philadelphia 24, Pa., or Pittsburg, Calif.*

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

When inquiring check 5910 opposite last page

new literature

Industrial bulletins pertinent to the reader . . . offering data on products, processes, services. Additional reviews of catalogs, bulletins, data sheets, etc., are found throughout other sections of this magazine

Isomerization process

Description of manufacturer's isomerization process designed to help refiners increase high octane pool by upgrading combined streams of pentane and hexane fractions, as well as natural gasoline, is contained in eight-page brochure. "Iso-Kel" brochure — The M. W. Kellogg Co., Dept. CP, 711 Third Ave., New York 17, N.Y. Check 5911.

Vermiculite formulations

Folder of four pages covers preparation of granular formulations of insecticides, herbicides, and fungicides with vermiculite as carrier. Hints on handling, formulating, and dry mixing are included. "Granular Formulations with Vermiculite" — Vermiculite Institute, Dept. CP, 208 S. LaSalle St., Chicago 4, Ill. Check 5912.

Controlling pipe corrosion

Plastic-coated steel pipe and tube are featured in four-page folder which describes problems of pipe corrosion. "X-Tru-Coat" folder — Republic Steel Corp., Dept. CP, 3100 E. 45th St., Cleveland 27, Ohio. Check 5913.

Carbon graphite bearings

Non-lubricated bearings made from carbon graphite material are described in 16-page catalog. Bearings Cat — Electro-Nite Carbon Co., Dept. CP, 8601 Torresdale Ave., Philadelphia 36, Pa. Check 5915.

Small plant filter

Operation, size, capacity, and other details of vertical pressure filters for clarifying water are contained in two-page bulletin. Pub 6321 — Cochrane Corp., Dept. CP, 17th St. below Allegheny Ave., Philadelphia 2, Pa. Check 5914.

Process data system

Bulletin of eight pages describes and illustrates data processing system designed and built to help process industries measure, monitor, compute, and record on-stream variations. Bul 3010 — Systems Div., Beckman Instruments, Inc., Dept. CP, 325 N. Muller Ave., Anaheim, Calif. Check 5916.

Work positioners

Advantages of self-leveling work positioners in solving many different material handling problems are demonstrated in six-page folder. Bul L-281-6 — Lowerator Div., American Machine & Foundry Co., Dept. CP, AMF Bldg., 261 Madison Ave., New York 16, N.Y. Check 5917.

Laboratory equipment

Specifications, diagrams, and photographs of manufacturer's laboratory equipment for operation in variety of positions or environments on steam, compressed air, or gas are presented in two-page bulletin. Vibrolator bul — Martin Engineering Co., Dept. CP, Neponset, Ill. Check 5918.

fire protection systems

How an investment in automatic sprinkler protection can amortize itself out of insurance savings, and bring many other economic benefits, is explained in an eight-page bulletin. Bul 78—"Automatic" Sprinkler Corporation of America, Dept. CP, Youngstown 1, Ohio. Check 5919.

industrial truck battery

Revised 12-page catalog highlights important features of manufacturer's batteries for use in electric industrial trucks. Form 5161 — Exide Industrial Div., The Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa. Check 5920.

Recirculating ovens

Bulletin of four pages describes manufacturer's bench- and cabinet-style ovens employing recirculation heating. Bul 125A — W. S. Rockwell Company, Dept. CP, 200 Eliot Street, Fairfield, Conn. Check 5921.

WANT MORE INFORMATION . . .

. . . about things you read about in the New Literature Section?

Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.

Pinch-type valve cat has corrosion guide

Detailed information on flexible, pinch-type, hose-bodied valves for abrasives, corrosives, and slurries is contained in 52-page catalog. Featuring corrosion guide, catalog also covers construction, operating characteristics, and installation and maintenance instructions. Cat FL-1116 — Farris Flexible Valve Corp., Dept. CP, Palisades Park, N.J. Check 5922.

Instrumentation Tapes

Answering basic questions about instrumentation tapes, eight-page brochure suggests applications for their use. Magnetic tapes described can be used for recording instrument measurements, computer programming and memory methods, automatic process control. Instrumentation Tape brochure — Magnetic Tape Division, Dept. CP, Minnesota Mining & Manufacturing Company, St. Paul 6, Minn. Check 5923.

Speedy bag filler

Bulletin of six pages lists features and specifications, and outlines operation of automatic, open-mouth bag filling machine. Bag filling machine bul — Kraft Bag Corp., Dept. CP, 630 Fifth Ave., New York 20, N.Y. Check 5924.

Describes vacuum filters

Four types of ceramic materials used to construct vacuum filters are described in four-page bulletin. Bul on ceramic vacuum filters — Chemical Equipment Div., General Ceramics Corp., Dept. CP, Keasbey, N.J. Check 5925.

Adjustable storage racks

Bulletin of eight pages describes and illustrates adjustable storage racks that can be installed without any tools. Bul SR-956 — Sturdi-Bilt Engineering Co., Dept. CP, 2501 Peterson Ave., Chicago 45, Ill. Check 5926.

New production machinery and techniques developed at W-S Fittings Division now assure you of prompt deliveries on corrosion resistant stainless steel pipe fittings. Your local W-S stainless steel distributor will be glad to fill your order from his stock.

W-S 150 lb stainless steel fittings, types 304 and 316, resist a wide variety of corrosive services in petroleum, chemical, petrochemical, food and other process industries. They are also ideal for many low temperature operations because of their inherent toughness at sub-zero conditions. W-S 150 lb fittings can be obtained in sizes ⅛" to 4" in either screwend or socket-welding types to meet your needs.

For detailed technical information on our 150 lb line, send today for Bulletin S-3-55. For prompt price and delivery information call your nearest W-S distributor.

Write to W-S Fittings Division, H. K. Porter Company, Inc., P.O. Box 95, Roselle, N. J.

H. K. PORTER COMPANY, INC.
W-S FITTINGS DIVISION

When inquiring check 5927 opposite last page

BJ offers a complete line of dependable horizontal cyrogenic pumps with BJ Lo-Temp Mechanical Seals for pumping such liquids as oxygen, nitrogen and methane.

Designed to handle liquids at temperatures as low as minus 320° F. with capacities to 3500 gpm against total heads to 1600 feet, this dependable standard line of pumps answers all low temperature requirements of liquid oxygen, nitrogen, methane pump users.

Only Byron Jackson combines years of knowledge in the two areas vital to creating a fully dependable pump and seal for this service: (1) years of engineering and (2) unchallenged leadership in the development of mechanical seals to assure reliable stuffingbox operation. This means that now you can get—on standard order—pumps to answer any sub-zero liquid handling requirements.

See your local Byron Jackson Pumps office for details or write for "BJ Pumps for Liquids at Sub-zero Temperatures."

Send for this informative file . . .

BJ

BYRON JACKSON PUMPS
INCORPORATED
A Subsidiary of Borg-Warner Corporation
BOX 2017A, TERMINAL ANNEX • LOS ANGELES 54, CALIFORNIA

When inquiring check 5928 opposite last page

NEW LITERATURE

Adsorptive processes

Both static and moving bed percolation adsorptive processes are discussed in 24-page bulletin. Special section is devoted to company's new patented "Continuous Percolation Process". Tech Info 401 — Minerals & Chemicals Corporation of America, Dept. CP, Menlo Park, N. J. Check 5929.

Explains proving rings

Bulletin of 12 pages is intended to acquaint engineers and technicians with proving ring and advantages in accuracy in systems which depend upon force measurement. "The A-B-C's of Accuracy in Weighing and Force Measurement Systems"—Morehouse Machine Company, Dept. CP, 233 W. Market St., York, Pa. Check 5930.

Clad metal finder chart

Designed as easy-to-use, reliable reference source, four-page bulletin contains technical data on clad metals, contact materials, and contact assemblies. Tech Data Bul CM-901 — American Silver Co., Dept. CP, 36-07 Prince St., Flushing 54, N.Y. Check 5931.

Self-sealing pipe fitting

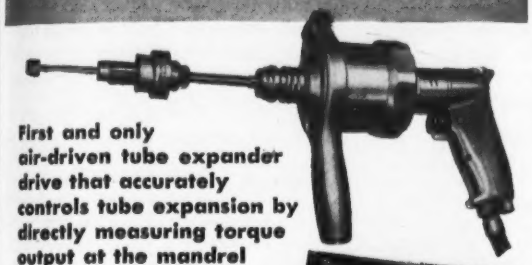
Bulletin of four pages gives details on self-sealing pipe fitting with Teflon insert. "Tru-Seal" bul — Tru-Seal Division, Flick-Reedy Corp., Dept. CP, 2040 North Hawthorne Ave., Melrose Park, Ill. Check 5932.

Production cost cuts

Ways to use low-cost optical instruments to simplify manufacturing and inspection operations are outlined in 12-page booklet. Information on magnifiers, microscopes, wide field tubes, macroscopes, and comparators is given. Booklet D-1059 — Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N.Y. Check 5933.

For Expanding
Heat Exchanger Tubes

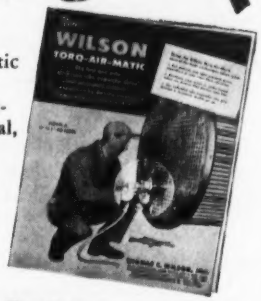
NEW
WILSON
Torq-Air-Matic



First and only air-driven tube expander drive that accurately controls tube expansion by directly measuring torque output at the mandrel

Only the Wilson Torq-Air-Matic offers all these features: air driven, automatic trip-off, completely integrated, non-electrical, non-frictional, calibrated in ft lbs torque, lightweight, simply adjusted.

Send for your copy of Wilson Bulletin 55.



Wilson Heavy-Duty Air Driven Cleaners

offer quick way to clean fouled heat exchanger tubes

Wilson Tube Cutter

easy to use, does fast job, a fine, reasonably priced tool

Representatives in principal cities
Thomas C. Wilson, Inc. • 21-11 44th Ave., Long Island City 1, N. Y.
Cable address: "Tubeclean", New York

WILSON TW-868

TUBE CLEANERS • TUBE EXPANDERS

When inquiring check 5934 opposite last page

Package classifier

Automatic electronic unit for check-weighing small packages and similar items is described and illustrated in two-page bulletin. Specifications and features are listed. Form T-9510 — Toledo Scale Company, Dept. CP, Toledo, Ohio. Check 5935.

Frictional temperatures

Manufacturer's newsletter contains technical paper on measurement of surface temperatures under sliding friction by newly developed thin thermocouple technique. "Lubrication Newsletter", Volume 1, No 2 — The Alpha Molykote Corp., Dept. CP, 65 Harvard Ave., Stamford, Conn. Check 5936.

Automatic wave analysis

How manufacturer's automatic wave analyzers can speed reduction of analog data and increase statistical reliability is discussed in four-page bulletin. Bul 901 — Davies Laboratories Div., Minneapolis-Honeywell Regulator Co., Dept. CP, 10721 Hanna St., Beltsville, Md. Check 5937.

PVC valves and fittings

Four pages of application tables on performance of normal and high impact polyvinyl chloride (PVC) valves and fittings for handling about 315 different fluids that attack other materials are featured in 16-page bulletin. PVC valve and fitting bulletin — Walworth Company, Dept. CP, 60 East 42nd Street, New York, N.Y. Check 5938.

Lists industrial equipment

Catalog of 16 pages lists and illustrates industrial and office equipment including furniture, shelving, and communication equipment. Industrial equipment catalog, 1957 — Precision Equipment Co., Dept. CP, 17 Precision Bldg., 3704B Milwaukee Ave., Chicago 41, Ill. Check 5939.

ARROW
AUTOPNEUMATIC CONTROL

The QUALITY ASSEMBLY
to thoroughly condition and control compressed air for pneumatic power tools and appliances.
• Filters • Regulates • Lubricates
Assemblies and units supplied in sizes ¼"-⅜"-½"-¾"-1" and 2" NPT.

The ARROW FILTER
- Removes up to 98% Free Moisture
- .001" to .002" Particle Removal
- Sintered Bronze Filter Element

The ARROW REGULATOR
- Self Bleed Assures Accurate Control
- Instantaneous Response
- In Line Flow

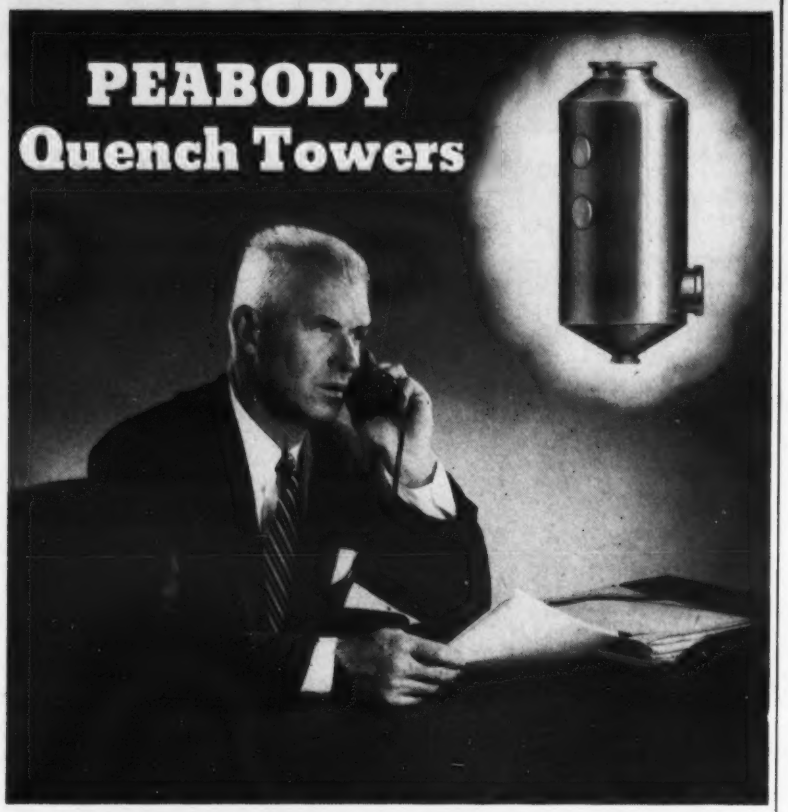
The ARROW LUBRICATOR
- Mist Lubrication
- Mist Proportional to Air Flow
- Lubricates Only When Equipment is in Operation

The ARROW DRAIN TRAP
- Fully Automatic
- Operates Independent of Pressure
- Double Sump Action to Protect Valve

QUALITY PRODUCTS SINCE 1914
Catalog and engineering data on request.

ARROW TOOLS, INC.
1904 S. KOSTNER AVE. • CHICAGO 23, ILL.

When inquiring check 5940 opposite last page



are still the answer!

★ *They quench, cool and clean gas—*

A large oil company in Texas uses a Peabody direct-contact quench tower in its ethylene plant. Cracked gas enters the tower at 600° F. and clean gas, cooled to 100° F., leaves at the rate of 103,500 C.F.M.

The Peabody Tower is adaptable to a wide variety of flow cycles. It quenches and cools high temperature gas from reforming furnaces or synthesis gas generators, and *simultaneously* removes particulate matter, such as tars and carbonaceous material.

This compact, low-pressure-drop unit provides minimum usage of low-pressure process water. It brings hot gas and coolant into intimate contact for positive mass transfer – gas can be cooled to within a few degrees of liquid inlet temperature. Outlet gas temperature and general performance can be held constant over a wide range of flow rates.

If you want clean, dry, cool gas, use a Peabody Tower.

PEABODY ENGINEERING CORPORATION
232 MADISON AVENUE, NEW YORK 16, N.Y.
OFFICES IN PRINCIPAL CITIES
PEABODY LIMITED • LONDON, S.W. 1, ENGLAND 7-101

When inquiring check 5941 opposite last page

New Filter Cloth Extra Tough Stuff

POLYMAX* Cloth has Remarkab
Properties for Heavy Duty U

What is POLYMAX

POLYMAX is the National Filter Media Corporation's name for filter media manufactured from the new olefin polymers known as "low pressure", "linear", "high density", or "high crystallinity" polyethylene.

Physical Properties

Fabrics manufactured of these new polymers have physical properties which are truly remarkable, when compared to conventional polyethylene or when compared to nylon. Tensile strength and resistance to stretching or elongation are important characteristics of filter media. The following table tells the story.

	Nylon high tenacity	conventional Polyethylene	POLYMAX
Tensile Strength PSI	89,000 to 108,000	11,000 to 35,000	50,000 to 150,000
% Elongation	19 to 24	20 to 80	10—med. orient. 5—high orient.

Physical Characteristics

Filter fabrics will be woven of monofilaments to duplicate existing monofilament Saran and Polyethylene fabrics. Fabrics woven with very fine monofilaments as well as multifilaments are under development.

Temperature Resistance — Shrinkage

POLYMAX has a softening temperature of 260° F and is sterilizable at 250° F. POLYMAX fabrics will be finished so that exposure to temperature in the 230° F-240° F range will result in minimum shrinkage.

Chemical Resistance

In general POLYMAX filter media equals or exceeds the chemical resistance of conventional Polyethylene. Tables for chemical resistance of Polyethylene can be used. POLYMAX shows markedly less effect of immersion in Chlorinated hydrocarbons, gasoline and lubricating oil.

Availability

Immediately available, either in the form of roll goods or sewn filter elements.

*Reg. trademark NFM Corp.

Weavers of Industrial Filter Media for over Fifty Years
NFM **NATIONAL FILTER MEDIA** *Corporation*

General Offices & Mills: New Haven 14, Conn.
Western Office and Factory: Salt Lake City 2, Utah
Sales Offices—Representatives
Los Angeles, Calif.: 811 West 7th Street
Chicago, Ill.: 6034 N. Cicero Ave.
Cincinnati, Ohio: Roselawn Center Bldg.
Houston, Texas: 1503 Hadley St.
Oslo, Norway: Nicolai Friis
Johannesburg, South Africa: Edward L. Bateman

When inquiring check 5942 opposite last page

Steel belt conveyor info

Bulletin of two pages explains and illustrates steel belt conveyor structure and operation. How elimination of need for many major components cuts initial conveyor costs is told. Illustrations show conveyor uses. "Tru-Track" conveyor bul — Steel Belt Conveyors Div., Sandvik Steel, Inc., Dept. CP, 1702 Nevins Rd., Fair Lawn, N.J. Check 5943.

Corrosion-resistant pumps

Catalog of 64 pages on manufacturer's line of corrosion-resistant pumps contains capacity and performance charts, engineering specifications, and illustrations and descriptions of new design features. Bul 1957 A — Waukesha Foundry Co., Dept. CP, Waukesha, Wis. Check 5944.

Circulating oil system

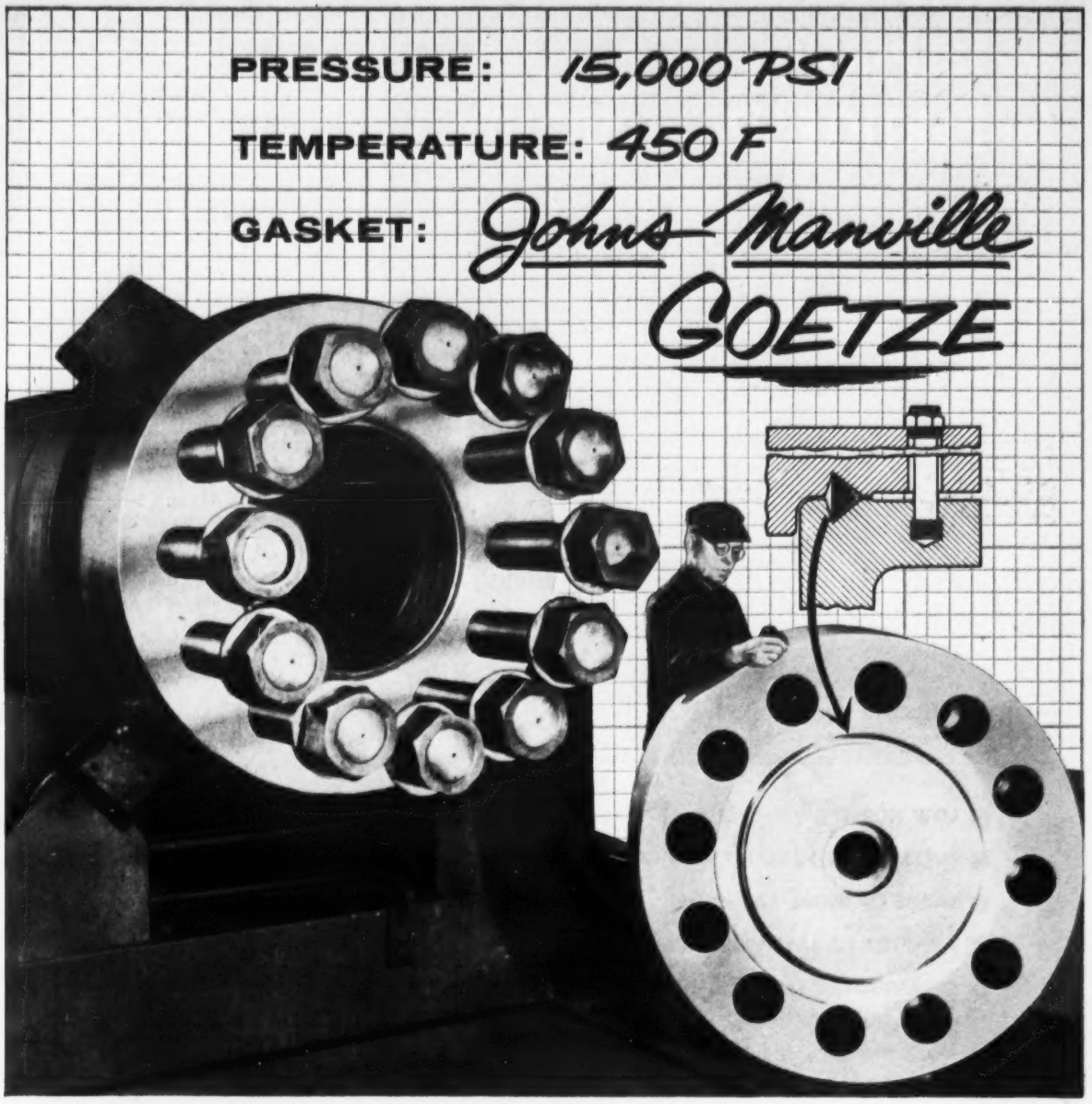
Manufacturer's circulating lubrication system, with built-in-return oil arrangements, is described in 8-page illustrated bulletin. Self-monitoring feature is pointed out. Bul 70—The Farval Corp., Dept. CP, 3249 E. 80th St., Cleveland 4, Ohio. Check 5945.

Humidity chamber data

Illustrated bulletin of two pages on relative humidity chamber features graph giving exact percent relative humidity available at various dry-bulb temperatures. Bul 5670 — Blue M Electric Company, Dept. CP, 138th & Chatham, Blue Island, Ill. Check 5946.

Details automatic controls

Catalog of 16 pages describes automatic "package" controls suitable for any industrial application where chemical or mechanical function can be measured electrically. Cat AC-2 — Tipptronic, Inc., Dept. CP, Fourth and Franklin Sts., Tipp City, Ohio. Check 5947.



How A. O. Smith maintains tight seals in giant "Multi-Layer" vessels

Today's tremendous pressures and temperatures have placed special demands on manufacturers of processing equipment. A. O. Smith has answered this need with a special type of "Multi-Layer" vessel construction. And Johns-Manville in turn has provided gaskets that assure tight seals under these exacting conditions. Typical of these is the delta type gasket, illustrated above, which was designed, for this application, to withstand pressures up to 15,000 psi. and temperatures to 500 F.

The development of special gaskets to meet special purposes has been the stock in trade of Johns-Manville's Goetze division for more than sixty-five years. Expert technicians possess a knowledge of metals and other factors related to gasket design and performance that is unmatched in the field. What's more, intensive specialization and modern production tooling provide substantial cost savings on J-M gaskets.

If you need gaskets for high pressure vessels for similar applications, send us a drawing or template for quotation. If you have a sealing problem of any kind, J-M technicians will work directly with your own engineers to develop new gaskets —or adapt existing styles—to meet your specific requirements. Write for further information to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit (Toronto), Ontario.

JM PRODUCTS **Johns-Manville PACKINGS & GASKETS**

When inquiring check 5948 opposite last page

for DISPERSION...
for PARTICLE SIZE REDUCTION...
"ENTOLETER" CENTRIFUGAL MACHINES...

assure these Cost Saving Advantages...

- LOW HORSEPOWER REQUIREMENTS
- DIVERSITY OF PRODUCT APPLICATION
- LARGE OR SMALL CAPACITIES
- ADAPTED TO BATCH OR CONTINUOUS SYSTEMS
- DEPENDABLE OPERATION

Operation of the "Entoleter" Centrifugal Machine:

The product is fed by the inlets and distributor to the center of the rotor (A) consisting of two steel discs (B) spaced approximately one inch apart by specially designed impactors.

The material is spun out, by centrifugal force, into a thinning film as it approaches the periphery of the rotor. Powerful uncushioned impact action causes every particle of the material to be thoroughly processed by the "ENTOLETER" CENTRIFUGAL MACHINE.

For descriptive bulletins or information on free application tests in our Development Laboratory . . . contact the ENTOLETER DIVISION, P.O. Box 904, New Haven, Connecticut.

ENTOLETER DIVISION
SAFETY INDUSTRIES, INC.
P.O. Box 904 New Haven 4, Conn.

When inquiring check 5949 opposite last page

NEW LITERATURE

Impressed current anodes for cathodic protection

Data on use of high-silicon cast irons for cathodic protection are presented in eight-page bulletin. Composition, properties, and applications are discussed. Bul DA/lb — The Duriron Co., Dept. CP, Dayton, Ohio. Check 5950.

Discusses air filtration

Comparable efficiencies of various types of filters are shown, high efficiency filtration is defined, and basic information on filter selection is given in four-page bulletin. Bul 120 — Cambridge Filter Corp., Dept. CP, 738 East Erie Blvd., Syracuse 3, N.Y. Check 5951.

Petroleum processing

Company's engineering and construction services for petroleum industry are described in 28-page bulletin. Full line of refining processes offered is included. Bul 2547 — Chemical Plants Division, Blaw-Knox Company, Dept. CP, Pittsburgh, Pa. Check 5952.

Conversion slide rule

Forty different efflux-type viscosity cups are listed alphabetically on small disc of circular conversion slide rule, as described in bulletin. Method of conversion is given. Newsletter Volume 4, No 20 — Gardner Laboratory, Inc., Dept. CP, Bethesda 14, Md. Check 5953.

Primary amyl alcohol

Physical properties, specs, shipping data, uses, and physiological properties of primary amyl alcohol are discussed in four-page technical bulletin. Bul F-8517C — Union Carbide Chemicals Company, Div. of Union Carbide Corp., Dept. CP, 30 East 42nd St., New York 17, N.Y. Check 5954.

BASIC FACTS...

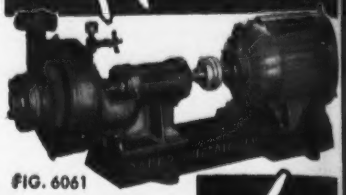


FIG. 6061

for DECIDING ON TYPE OF PUMP; Write for TABER BULLETIN S-146

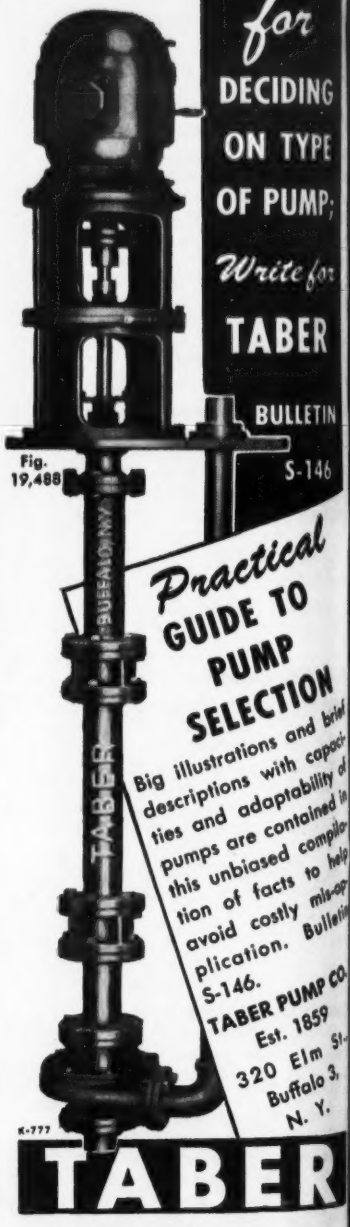


Fig. 19,488

Practical GUIDE TO PUMP SELECTION

Big illustrations and brief descriptions with capacities and adaptability of pumps are contained in this unbiased compilation of facts to help avoid costly mis-application. Bulletin S-146.

TABER PUMP CO.
Est. 1859
320 Elm St.
Buffalo 3, N. Y.

K-777

TABER

When inquiring check 5955 opposite last page

Battery manual

Complete engineering specifications are listed in eight-page bulletin which describes manufacturer's industrial truck battery. Bul GB1567B — Gould-National Batteries, Inc., Dept. CP, Trenton 7, N.J. Check 5956.

Use of silicon

Characteristics of silicon in rectifiers, solar batteries, transistors, and other applications are described in 20-page monograph. "The Relation of Silicon and Its Properties To The Electronics Industry" — Aries Laboratories, Inc., Dept. CP, 41 East 42nd St., New York 17, N.Y. Check 5957.

Industrial water problems

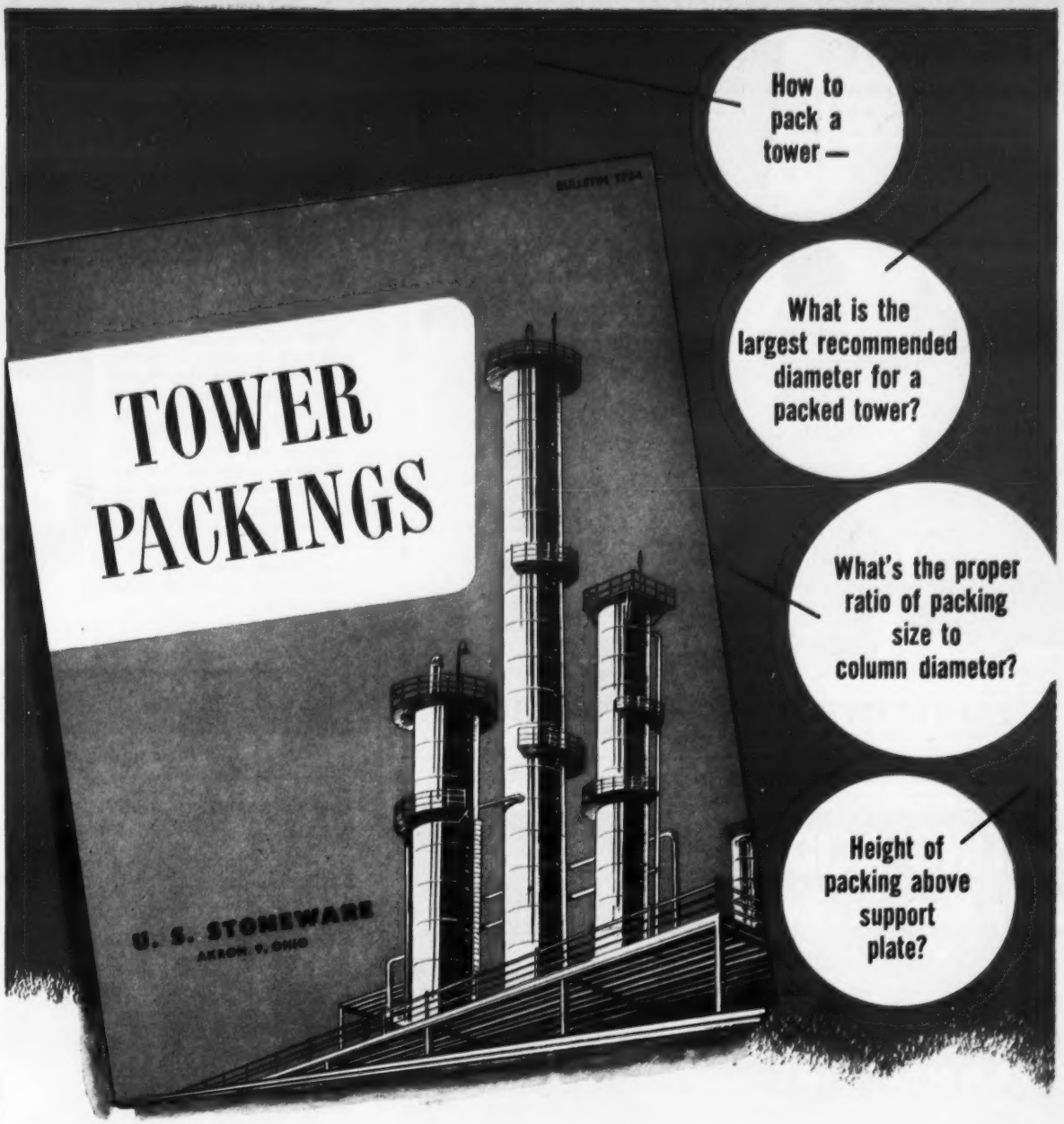
Common problems of slime and algae in recirculating cooling water systems are covered in 12-page technical paper. Control agents used to overcome this situation and selection of proper toxicants are also discussed. Tech paper 134 — Betz Laboratories, Inc., Dept. CP, Philadelphia 24, Pa. Check 5958.

WANT MORE INFORMATION . . . about things you read about in the New Literature Section?

Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.


TOWER PACKINGS
U. S. STONEWARE
AKRON 9, OHIO
How to pack a tower—
What is the largest recommended diameter for a packed tower?
What's the proper ratio of packing size to column diameter?
Height of packing above support plate?

Such helpful information as this is contained in a new booklet (TP54) which we have prepared to describe the physical and chemical data on Tower Packings. It is free on request to chemical engineers, engineering students and colleges.

Data also includes sizes, surface area, number per cubic foot, percentage of free gas space, etc., on Raschig Rings (ceramic, metal and carbon), Intalox Saddle Packing, Berl Saddles, Lessing Rings, Cross-Partition Rings, Spiral Rings, and Metallic Pall Rings.

Write for it today. Address Dept. CP-957
The U. S. Stoneware Co., Akron 9, Ohio

U. S. STONEWARE
AKRON 9, OHIO

51-9

When inquiring check 5959 opposite last page

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GENERAL OFFICES AND PLANT: 22 WOODHULL STREET, BROOKLYN 31, NEW YORK

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When inquiring check 5960 opposite last page

PLATING ACIDS Safely Floor-Drained with Chemi-Drain CHANNEL PIPE

This Chemi-Drain system was installed for handling waste, overflow, washdown, and reclamation of highly corrosive plating solutions at a Flint, Michigan, automotive parts factory. Construction time was cut by more than 25%, compared with hand-laid acid brick channels in the same plant. Chemi-Drain comes in convenient three-foot sections—makes acid-proof channels of any depth from 4" to 12". For full details, write: The Logan Clay Products Co., Box 698J, Logan, Ohio.

DISTRIBUTOR INQUIRIES INVITED

first TO GUARANTEE NOW EXTENDED TO 75 YEARS

LOGAN ESTABLISHED 1890

LC-566-9

THE LOGAN CLAY PRODUCTS COMPANY • BOX 698J • LOGAN, OHIO

When inquiring check 5961 opposite last page

for Air or Gases containing Solids *install*

KWIKLEEN VALVES

Not only do these valves provide full pipe flow (unobstructed by seats or bends), as well as quick shut-off, but they minimize time loss in cleaning. Accumulated solids drop into sediment chamber. Bottom end plate is quickly removed and solids drop out. No dismantling from pipe line.

Kwikleen Valves are made of any required metal in standard 4" to 16" sizes and special larger sizes; manual or mechanical operators. Write for bulletin.

W. S. ROCKWELL COMPANY — 720 Eliot Street, Fairfield, Connecticut

When inquiring check 5962 opposite last page

SERVING INDUSTRY FOR 76 YEARS

Send Specifications for an estimate. Department 27

THE C. O. JELLIFF MANUFACTURING CORP
SOUTHPORT • CONNECTICUT • USA

When inquiring check 5963 opposite last page

Report on smog problem

Report of 24 pages presents data on project exploring possibilities of catalytic decomposition of nitric oxide, given off from automobile exhausts. This project, conducted by Armour Research Foundation, is part of effort to find answers to smog problem. To obtain Report 20, remit $1.50 direct to Air Pollution Foundation, Dept. CP, 2556 Mission St., San Marino, Calif.

Variable-speed drives

General specifications and engineering data on manufacturer's variable-speed drives are contained in four-page bulletin. Bul S790 — Magnetic Amplifiers Inc., Dept. CP, 632 Tinton Ave., New York 55, N.Y. Check 5964.

Synthetic rubber sealer

Bulletin of eight pages illustrates, lists, and explains typical uses of synthetic rubber compounds for glazing, sealing, and caulking. Synthetic Rubber Compound Bul— David E. Long Corporation, Dept. CP, 220 East 42nd Street, New York 17, N. Y. Check 5965.

Steam analysis

Results of extensive laboratory and plant work to indicate that sodium is extremely valuable in evaluating steam purity are presented in eight-page technical paper. Tech paper 135 — Betz Laboratories, Inc., Dept. CP, Gillingham & Worth Sts., Philadelphia 24, Pa. Check 5966.

Rids LPG truck exhausts of dangerous fumes

Removal of carbon monoxide and other air contaminants from exhausts of LPG trucks by catalytic purifiers is described in five-page reprint. Reprint, "Sweetening the Fork Truck's Breath" — Oxy-Catalyst, Inc., Dept. CP, Wayne, Pa. Check 5967.

What good is specialized business publication advertising?

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front . . . the men the ads are supposed to help . . . the men who sell.

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized market to which he sells:

Chester Burt
American Hard Rubber Co.

Sells industry

Says Mr. Burt: "After some years as an inside man at American Hard Rubber, I'm taking on my first sales territory and believe me, I'd be worried if I didn't have good leads from our business paper advertising. They give me something to latch on to. With an advertising lead as a start I find there's a better possibility of something coming from a call than if I made a cold call.

"For one thing, even if the man who sent in the inquiry isn't in a very important position in the company, at least the inquiry gets me through the door and once I'm inside I can work it out.

"Another thing I've found is that I can do a better job of planning my trips if I have some advertising leads. More worthwhile calls can be scheduled and it's possible to accumulate leads to make a profitable trip to out-of-the-way areas. Of course, on top of all this, I think that in many cases where I've gotten business, trade advertising has reached some of the people inside that I can't see; like people who leave it to others to interview salesmen, but still have to give the final okay themselves."

Why not ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

The Mill

NBP

One of the 207 members of National Business Publications, Inc. . . . each of which serves a specialized market in a specific industry, trade or profession.

Lighter! Tighter!

LUNCOR PVC *VALVES*

Defy Corrosion!

FIG. 2600—125 WP—140° F.

Replace expensive high-alloy or glass-lined valves in your corrosive services with these money-saving, high-performance valves. Luncor is the first all-molded PVC valve designed and engineered by a valve manufacturer . . . and its low-cost performance is proved in handling most common corrosive solutions. Luncor Valves weigh only half as much as aluminum—one-sixth as much as bronze. Yet their high strength-weight ratio gives them rigidity comparable to metal. Luncor Valves are available in one-half inch through two inch sizes.

To list only a few . . . Luncor PVC Valves have established outstanding records for economy and service in the following operations:

- PAPER MILLS
- CHEMICAL PLANTS
- FOOD PROCESSING
- BEVERAGE BOTTLING
- PETROLEUM REFINING
- SUGAR REFINING
- WATER TREATMENT
- MARINE INSTALLATIONS

For detailed service recommendations . . . request a *Confidential Corrosion Service Information Form* from your Lunkenheimer Distributor, or from The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

BRONZE • IRON • STEEL • PVC

L-857-9

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

When inquiring check 5969 opposite last page

NEW LITERATURE

Motor-grader advantages

Catalog of 16 pages describes working advantages of manufacturer's motor grader. Cat MS-1148 — Construction Machinery Div., Allis-Chalmers Manufacturing Company, Dept. CP, Milwaukee, Wis. Check 5970.

Describes digester

Bulletin of eight pages explains construction and operation of three basic elements of continuous-type digester for pulp mill. Bul PC-20 — Pandia Div., The Black-Clawson Company, Dept. CP, Hamilton, Ohio. Check 5971.

Ceramic coating bulletins

Features, procedures, and applications of flame-sprayed ceramic coatings are presented in two-page bulletin. Bul on Flame Rock — The Montaine Corporation, Dept. CP, 2446 South Prairie Avenue, Chicago 16, Ill. Check 5972.

Details magnetic separator

Design, capacity, and application information for manufacturer's electro-magnetic separator are covered in two-page bulletin. Bul MB-103 – Carpo Manufacturing, Inc., Dept. CP, Jacksonville 6, Fla. Check 5973.

General purpose pumps

Bulletin of six pages details applications, features, and specifications of general-purpose, close-coupled, centrifugal pumps. Bul 214 — Carver Pump Company, Dept. CP, Muscatine, Iowa. Check 5974.

Describes chart printers

Folder of four pages describes printers that record on strip charts from remote points. "Identicharts" — Royson Engineering Co., Dept. CP, Hatboro, Pa. Check 5975.

Always Stronger Than They Need Be!

MIDWEST

WELDING FITTINGS

Below are photographs of two of the many tests that have been made of Midwest Welding Fittings. The results are *always* the same . . . the seamless pipe to which the fittings are welded invariably bursts. There is *never* any sign of fitting failure or weakness.

There's good reason for this. We make elbows and tees of inherently stronger metal . . . the Midwest exclusive method of manufacture enables us to maintain greater minimum wall thickness, and to reinforce the fittings at points of greatest stress. For the many other advantages of Midwest Fittings, ask your Midwest distributor or write us for Catalog 54.

MIDWEST PIPING COMPANY, INC.

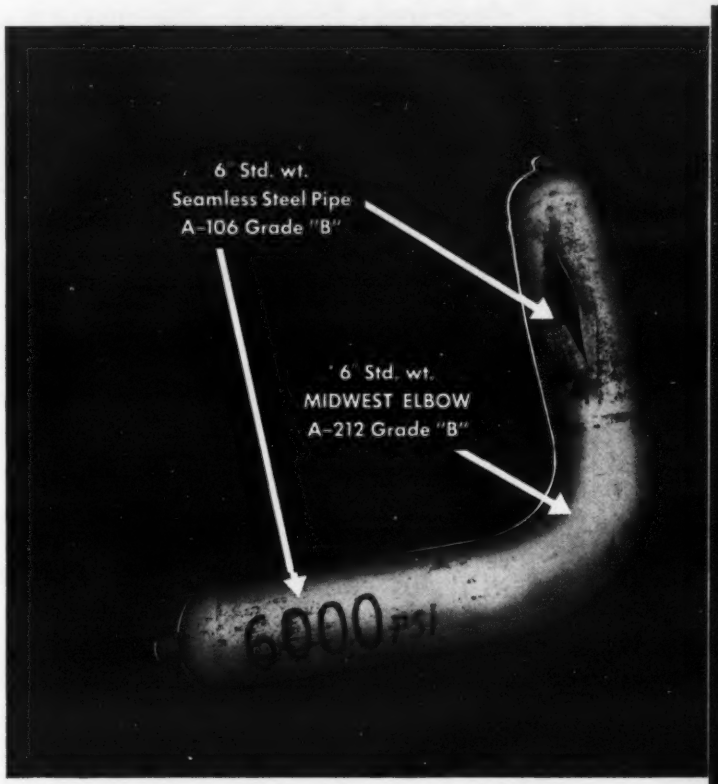
Main Office: 1450 South Second St., St. Louis 4, Mo.

PLANTS: ST. LOUIS, CLIFTON, N. J. and LOS ANGELES

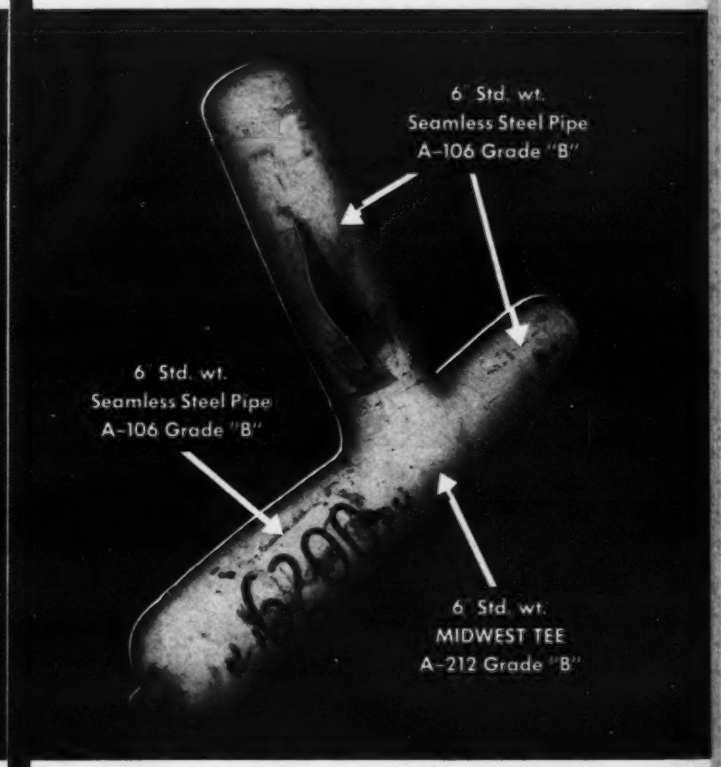
SALES OFFICES:

ASHEVILLE (BOX 446, SKYLAND, N. C.) • BOSTON 27—426 FIRST ST.
CHICAGO 3—79 WEST MONROE ST. • CLEVELAND 14—616 ST. CLAIR AVE.
HOUSTON 2—1213 CAPITOL AVE. • LOS ANGELES 33—520 ANDERSON ST.
MIAMI 34—2103 LE JEUNE RD. • NEW YORK 7—50 CHURCH ST.
ONEIDA, N.Y.—282 NORTH MAIN ST. • SAN FRANCISCO 11—420 MARKET ST.

STOCKING DISTRIBUTORS IN PRINCIPAL CITIES



Typical bursting test of stock Midwest Welding Elbow. As is always the case, failure occurred in the seamless pipe while the elbow was undamaged. Bursting pressure was 6000 psi . . . considerably above the required code minimum for seamless pipe. (Minimum allowable bursting pressure for 6" standard weight A-106 Grade B seamless steel pipe is 4438 psi.)

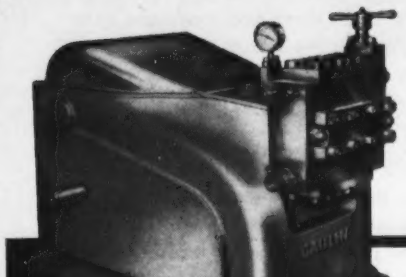


Bursting test of Midwest Welding Tee taken at random from stock. As always, the failure occurred in the seamless pipe and not in the fitting. The non-shock internal bursting pressure of 6200 psi is well above the code minimum for seamless pipe. (Minimum allowable bursting pressure for 6" standard weight A-106 Grade B seamless steel pipe is 4438 psi.)

7761

For more information on product at right, specify 5976 see information request blank opposite last page.

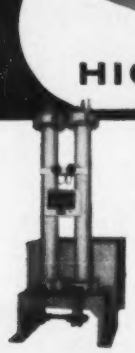
MIDWEST **WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS**



Pump, Control, Move *Liquids, Slurries, Viscous and Abrasive Fluids*

with

GAULIN
HIGH PRESSURE PUMPS



These two special pumps can control and move a wide variety of materials.

Triplex Hi-Pressure Pumps handle large volume of all types and densities of fluids. Capacities to 6000 gph, pressures to 8000 psi, temperatures from −90°F to +550°F. Used for all types of product — sanitary, corrosive, abrasive, viscous and volatile — for transfer, metering, injection, testing and spray drying.

Gaulin HX — hydraulic pressure exchange pump — specially designed for extremely abrasive and corrosive muds, slurries and solutions. Slow cycle operation — no plungers, no packing pressures to 2000 psi, capacities to 120 gpm.

Ask for G.T.A. to help you select the right pump for your requirement... over 100 different models have been developed to handle all types of pumping problems.

Gaulin

G. T. A. ... Means Gaulin Technical Assistance — best source on how to mix or move your product.

FREE! *Send for the G.T.A. Library of Product Information.*

Manton-Gaulin Manufacturing Co., Inc., 55 Garden Street, Everett 49, Mass.

When inquiring check 5977 opposite last page

---

for more accurate chemical feed control at LOWER COST use a...

"Packaged"

NEPTUNE
CHEMICAL FEED UNIT

Tank, agitator and pump are combined in one smooth operating system that precisely proportions anything from treating chemicals, such as calgon, to petroleum distillates.

JUST PIPE-IN . . .
PLUG-IN . . . AND OPERATE!

You'll get positive, accurate proportioning of chemicals when you use a NEPTUNE "packaged" chemical feed unit. That's because tank, agitator and pump are designed and built into one precisely-engineered chemical feed system. In addition to lower first cost and minimum upkeep, longer life is assured by 316 stainless steel piston, valves and ball checks.

- **simply designed pump can be regulated easily to proportion exact quantities of chemical continuously**
- **agitator keeps precipitates from settling, assuring constant solution strength**
- **Y-type strainer removes harmful solids, prevents pump damage**

Write, wire or call for additional details and let us bid on your requirements.

NEPTUNE PUMP MANUFACTURING CO.
chemical proportioning pumps and sump pumps

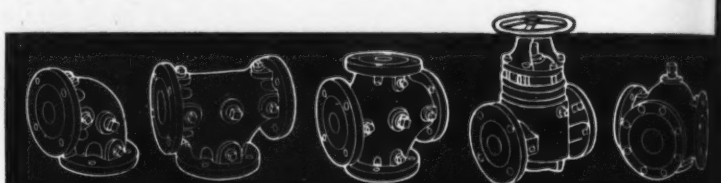
4912 NORTH 6TH STREET
PHILADELPHIA 20, PA.
phone: DAvenport 9-4983

When inquiring check 5978 opposite last page

H&B JACKETED PIPE and FITTINGS

● The above cutaway illustrates H & B standard jacketed welded pipe and fitting construction, designed to allow complete jacketing of the product pipe. Special jigs and fixtures enable H & B to insure complete uniformity of the jacket area in relation to the O D of the product line and the I D of the jacket pipe. All H & B jacketed equipment is hydrostatically tested at 450 to 500 p.s.i. H & B welded steel jacketed fittings are ideally suited for process piping of pressures reaching 300 p.s.i. and temperatures up to 750°F. . . . A few of these fittings and valves are illustrated below. For more information send for bulletin J-57.

HETHERINGTON & BERNER INC. • 711 KENTUCKY AVE., INDIANAPOLIS 7, IND.



When inquiring check 5980 opposite last page

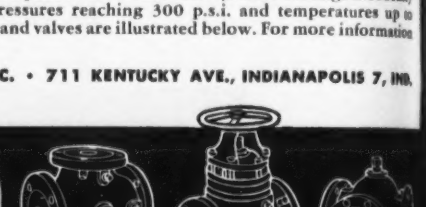
Changed Your Address?

BE SURE TO LET US KNOW!

If you have recently changed your address you'll want to make sure that your copy of CHEMICAL PROCESSING continues to reach you . . . just use this convenient form.

Please answer all the questions as completely as possible.

Mail request to
Reader Service Dept.
Chemical Processing
111 East Delaware Place
Chicago 11, Illinois



Former Company Affiliation .....

Former Address .....

Your Name ..... Present Title

Present Company .....

Main Product .....

Rating of Company .....

Street Address .....

City ..... Zone No. ..... State

Nickel-base alloy data

Up-to-date information on four nickle-base alloys is presented in 104-page booklet. Chemical compositions, and physical, mechanical, and high-temperature properties are described. Comparative resistance table to over 250 corrosives commonly handled in chemical, petroleum, paper, pulp, pharmaceutical, and metal-working industries is included. "Hastelloy Corrosion-Resistant Alloys" — Haynes Stellite Co., Div. of Union Carbide Corp., Dept. CP, 420 Lexington Ave., New York 17, N.Y. Check 5981.

Lists zirconium properties

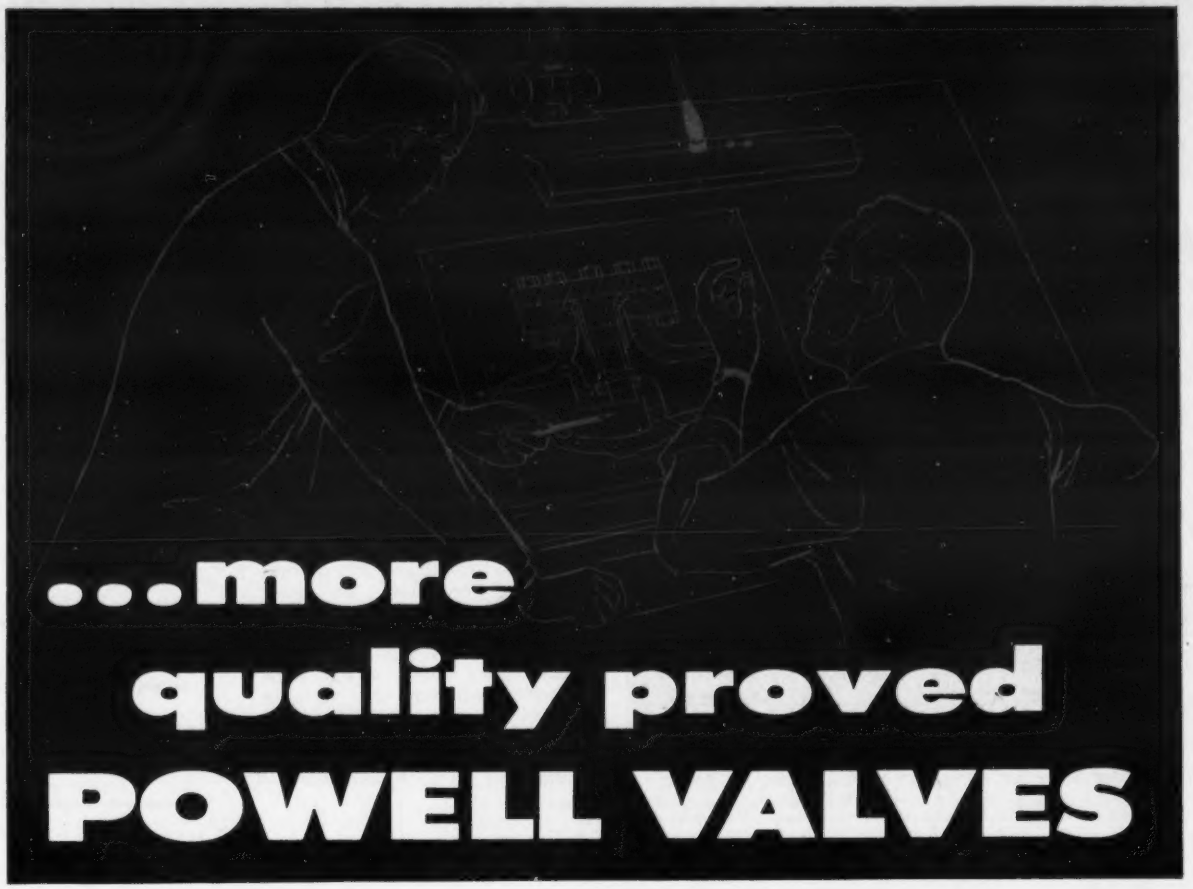
Physical properties of zirconium and alloys and mechanical properties of three different tempers of these metals are contained in 10-page special analysis memo.
Information on fabrication, machining, and grinding is included. Corrosion resistance to various liquids and gases is discussed. Special Analysis Memo 112 — Superior Tube Co., Dept. CP, 1512 Germantown Ave., Norristown, Pa. Check 5982.

Acrylonitrile polymers

Preferred lab techniques for polymerizing and copolymerizing acrylonitrile are presented in detail in 76-page bulletin. Monomer reactivity ratios and their utilization in designing experimental procedures are discussed. Bul on polymers and copolymers of acrylonitrile — Petrochemicals Dept., American Cyanamid Co., Dept. CP, 30 Rockefeller Plaza, New York 20, N. Y. Check 5983.

Butyl rubber kit

Along with latest information on market developments, manufacturer's kit contains bulletin on evaluation of butyl accelerators, and study of carbon black in butyl rubber. "Butyl Rubber" — Thiokol Chemical Corp., Dept. CP, 780 N. Clinton Ave., Trenton 7, N.J. Check 5984.



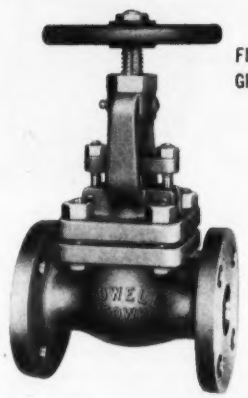
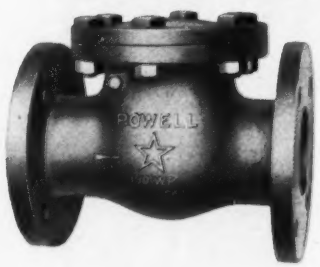


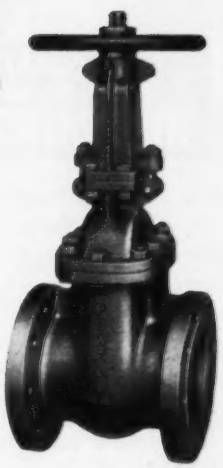
FIG. 2475—Stainless Steel O.S. & Y. Globe Valve for 150 Pounds W.P.

FIG. 2309 SW—150-Pound Flush Bottom Tank Valve with Powell Patented Seat Wiper.

FIG. 2456 SG—Large Stainless Steel Gate Valve for 150 Pounds W. P. Flanges conform to latest Standards.

FIG. 2433 SS—Large Stainless Steel Swing Check Valve for 150 Pounds W.P.





Designed for long life, designed for dependable service

Consult your Powell Valve distributor for all the facts about quality proved bronze, iron, steel and corrosion-resistant valves. No matter what the flow control problem, a Powell Valve can solve it . . . *better.*

THE WM. POWELL COMPANY, CINCINNATI 22, OHIO . . . 111th YEAR

When inquiring check 5985 opposite last page

M·E·K

prices go up again!

M.E.K. users are caught in a price squeeze, as costs advance ½c lb. to a new high of 85c gal.

Users who recover M.E.K. for re-use do so at only 8c gal.

The difference between 85c gal. and 8c gal. is a Barnebey-Cheney automatic solvent recovery system.

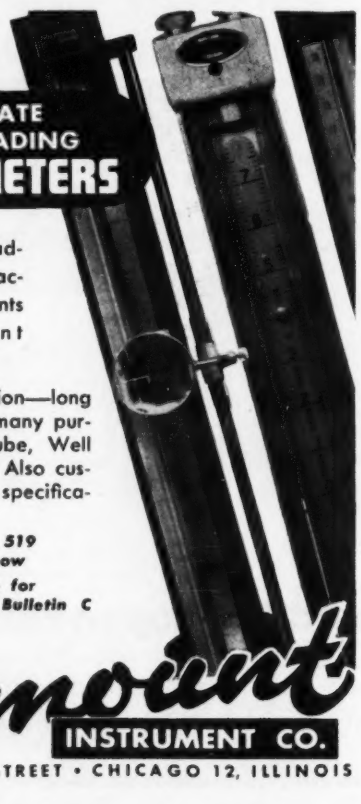
Quantity users of M.E.K. can realize these important savings by solvent recovery.

Ask for Bulletin W-23.

ACTIVATED CARBON
Purification & Recovery Equipment
BARNEBEY-CHENEY

CASSADY AT EIGHTH COLUMBUS 19, OHIO
Los Angeles • San Antonio • St. John's, Quebec

When inquiring check 5986 opposite last page



ACCURATE
EASY READING
MANOMETERS

For precise reading as well as for accurate measurements choose Trimount Manometers.

Sturdy construction—long lasting—used for many purposes—Multiple Tube, Well Type, U Tube, etc. Also custom made to your specifications.

See our booth 519 at The ISA show

Write for Illustrated Bulletin C

Trimount
INSTRUMENT CO.
3119 WEST LAKE STREET • CHICAGO 12, ILLINOIS

When inquiring check 5987 opposite last page

NEW LITERATURE

Zirconium bibliography

Sources of information pertaining to applications and mechanical, physical, electrical, chemical, and nuclear properties of zicronium and its alloys are presented in seven-page bibliography. Tabulation is believed to contain all major books, pamphlets, and articles published since 1950. Zirconium Bibliography — Columbia-National Corporation, Dept. CP, 70 Memorial Dr., Cambridge 42, Mass. Check 5988.

Corrosion-resistant pump selector manual

Manual of 20 pages presents comparative data on four types of corrosion-resistant pumps for any application up to 350 gpm. Nearly 200 chemicals are listed, along with recommendations on suitable pump to use. Bul CE-55 — American Hard Rubber Co., Dept. CP, 93 Worth St., New York 13, N.Y. Check 5989.

Aluminum corrosion guide

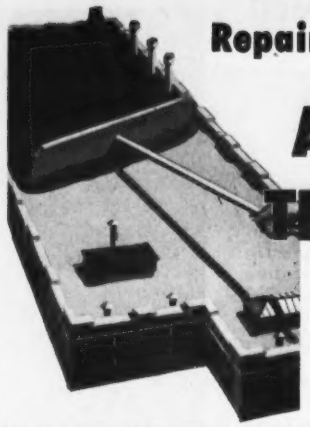
As an aid to engineers using aluminum in process plants or equipment, handy six-page guide tells at a glance the yearly corrosion rate of more than 100 chemicals and other materials on aluminum. "Corrosion Keys for Aluminum" — Reynolds Metals Co., Dept. CP, 2500 S. Third St., Louisville, Ky. Check 5990.

Totally-enclosed motor

Bulletin of 14 pages covers totally-enclosed motors for chemical and allied industries. Features which permit motors to operate in high humidity or corrosive fumes are explained. Bul 51M 7500-78 — Allis-Chalmers Mfg. Co., Dept. CP, PO Box 512, Milwaukee 1, Wis. Check 5991.

For pipe protection

Bulletin of 16 pages illustrates and describes PVC-backed tape designed for protecting pipelines and pipe fittings from corrosion. Pipe Tape Bul — Minnesota Mining & Mfg. Co., Dept. CP, St. Paul 6, Minn. Check 5992.



Repair your roof
AT HALF
THE COST!

NEW TROPICAL COLD PROCESS ROOFING SAVES YOU MONEY!

Make your old roof as good as new—and save 50%. No special equipment or training needed. Your own unskilled labor can easily apply Tropical Cold-Process Roofkoter. You save on labor, restore years of trouble-free service to leaky roofs. Roofkoter forms a tough, flexible, water-tight film that resists extreme heat and cold, will not blister, harden or dry out. Applies cold, eliminates fire hazard. Roof reconditioning the Tropical way can save leaky roofs.

FREE! **"Saving Old Roofs" gives you the complete story on modern roof maintenance. Write for your copy today!**

TROPICAL PAINT COMPANY
1128-1238 W. 70th, Cleveland 2, Ohio
HEAVY-DUTY MAINTENANCE PAINTS SINCE 1911
SUBSIDIARY OF PARKER RUST PROOF CO.

When inquiring check 5993 opposite last page

FREE!
NEW
SOLENOID VALVE
CATALOG

Atkomatic's completely new engineering guide . . . Catalog 200-A

Automatic flow control —air, gas, steam, liquids

Send for it!

Solve YOUR flow control problems Atkomatic-ly

Order from a complete line of two-way solenoid valves . . . fully illustrated and described in Atkomatic's new engineering catalog. Contains flow charts, coil charts, dimensions, applications. For economical, trouble-free operation depend on Atkomatic.

- Built to your specifications
- Individually tested
- Packless
- Tight closing
- Low maintenance
- Rugged, dependable
- Bronze or stainless steel
- Temperatures to 450°
- High and low pressures
- ¼" to 3" full port pipe size

SEND TODAY FOR CATALOG 200-A

Atkomatic VALVE CO., INC.
DEPT. 1M, 545 W. ABBOTT ST., INDIANAPOLIS, INDIANA

When inquiring check 5994 opposite last page

DO YOU REQUIRE MORE EFFICIENT DEWATERING SIEVING or GRADING in your chemical processing OPERATION?

The answer to your problem may lie in using...

H&K

PERFORATED METAL SCREENS

MADE FOR LONG LIFE, H & K screens can be perforated in stainless steel, monel or other corrosion-resistant alloys. Easy to keep clean H & K perforated screens can be furnished to specified size or shape in practically any material from foil-thin to 1" thick.

Contact either H & K office or an agent. We will be glad to work with you on your perforated screen requirements.

FILL IN AND MAIL COUPON TO OFFICE AND WAREHOUSE NEAREST TO YOU.

FIND NEAREST H & K AGENT IN THE 'Yellow Pages'

Listed Under "Perforated Metals"

THE Harrington & King PERFORATING CO. INC.

Chicago Office and Warehouse 5636 Fillmore Street Chicago 44, Ill.

New York Office and Warehouse 110 Liberty Street New York, N.Y.

Please send me—

☐ GENERAL CATALOG NO. 62

☐ STOCK LIST of Perforated Steel Sheets

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

When inquiring check 5995 opposite last page

NEW LITERATURE

Air compressors

Illustrated 44-page catalog on manufacturer's motor-driven compressors gives capacities, specifications, and typical data for industrial requirements from 200 to 2000 hp. Bul M-81 —The Cooper-Bessemer Corp., Dept. CP, Mount Vernon, Ohio. Check 5996.

Thermistor catalog

Listing typical applications and circuitry, 10-page catalog gives specifications and characteristics of wafer, rod, and bead thermistors. Bul T-100 — Gulton Industries, Inc., Dept. CP, 212 Durham Ave., Metuchen, N.J. Check 5997.

Conveyor for concrete

Specifications and operating features of manufacturer's conveyor for handling concrete are listed in four-page booklet. Form 157 — The Fairfield Engineering Company, Dept. CP, Marion, Ohio. Check 5998.

Bump pump data

Folder of 60 pages describes uses, features, specifications, capacities, and cross-sectional drawings of industrial pumps for chemical and other applications. Bump Pumps folder— Bump Pump Div., Ulrich Manufacturing Co., Dept. CP, Roanoke, Ill. Check 5999.

Alarm systems

Manufacturer's annunciator alarm systems are described and illustrated in two-page bulletin. "Annunciator Alarm Systems" — The Scam Instrument Corp., Dept. CP, 1811 W. Irving Park, Chicago 13, Ill. Check 6000.

Resistance thermometers

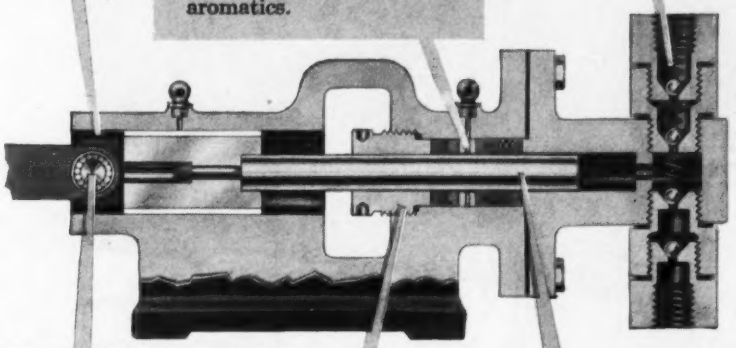
Bulletin of four pages describes manufacturer's line of resistance-thermometer elements. Bul T-56 — Arthur C. Ruge Associates, Inc., Dept. CP, 733 Concord Ave., Cambridge 38, Mass. Check 6001.

PICK THIS PUMP for reliability and maintenance economy...

CROSS HEAD is oversized, running in carefully machined guide—preventing usual pump failures at this point. All moving parts and packing can be removed without breaking piping connections.

LIQUID ENDS: Valves are machined from solid stainless steel. No pressed seats to work loose. Valve balls are hardened and ground, and stainless steel spring-loading insures instant response, even on viscous liquids and slurries.

LANTERN RING readily changed from grease to water or oil seal for handling crystallizing liquids, slurries, corrosives, volatile toxics, aromatics.



CONNECTING ROD BEARINGS— hardened and ground pins running in grease lubricated needle bearings, replace the usual rapidly-wearing bronze bushings.

PISTONS are stainless steel, ground and polished. Accurate capacity control is obtained by piston stroke length adjustment. Adaptable to both manual control and instrumentation.

PACKING GLANDS are easily accessible at both ends to simplify packing replacement. Gland take-up is a screwed nut, insuring even pressure on packing—no cocking, less packing trouble.

For more facts about Philadelphia type S Pumps — for 85% of all chemical pumping needs — write for Bulletin S-1254.

PHILADELPHIA PUMP DIVISION OF AMERICAN METER COMPANY

13500 Philmont Ave., Phila. 16, Pa.

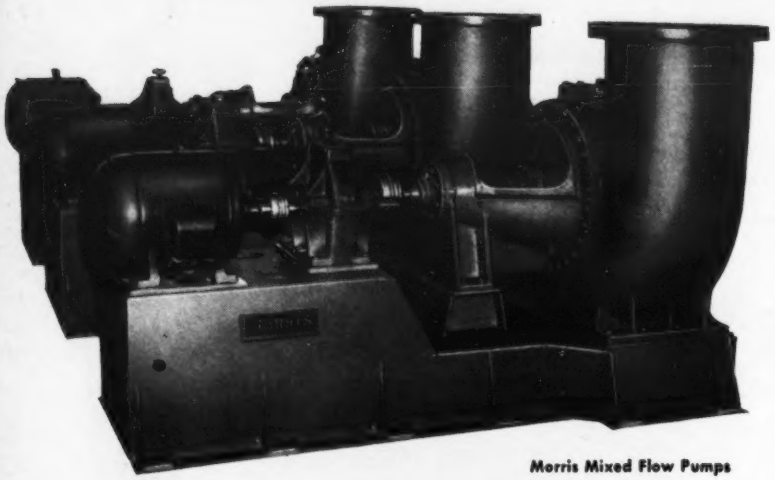
PHILADELPHIA PUMP

DIVISION OF AMERICAN METER COMPANY / EST. 1836

When inquiring check 6002 opposite last page

MORRIS . . . . Peak Pump Performance . . . . . and more

Conservatively Rated Capacities, Plus Margins of Safety to Handle Normal Overloads in Year 'Round Operation



Morris Mixed Flow Pumps

There is a Morris Pump That Suits Your Job Better

Morris pumps have that built-in margin of safety that assures you peak performance in your pumping operation

Rugged durability permits continuous operation even under the most strenuous working conditions. Modern design and engineering assure freedom from mechanical difficulties. The Morris pump operates with a minimum of attention . . . lowers maintenance costs . . . can be quickly dismantled for inspection . . . avoids lengthy lay-up time. For heavy duty pumping . . . specify Morris.

The vast experience of Morris sales engineers enables them to recommend the Morris Pump best suited for your particular Job. For more complete information write today.

MORRIS CENTRIFUGAL PUMPS

MORRIS MACHINE WORKS
BALDWINSVILLE, N. Y.
Sales Offices in Principal Cities

When inquiring check 6003 opposite last page

"Varec" AUTOMATIC TANK GAUGES

MAGNETIC DRIVE for HIGH PRESSURE PETROCHEMICAL SERVICE

FIG. NO. **2500C**

When you buy automatic tank gauges for petrochemical service – accuracy and safety are important requisites. "Varec" offers you both. Accuracy is assured by counter and dial reading, clear and distinct–without the danger of parallax or difficulty of reading a scummy tape. Dependable safety is insured by the magnetic drive rotating the counter and dial reading mechanism, Remote Gauger Transmitter or other auxiliary equipment. Prevents pressurizing sight glass chamber or transmitter housing. Isolates both from corrosive or dangerous tank vapors. Sight glass is kept clear without use of wiper. No danger to personnel by possible glass breakage.

In addition to these exclusive features, the Fig. No. 2500C and Fig. No. 2500CR have a host of advantages:

1. Neg'ator motor for motive power.
2. S.S. type 316 sheaves.
3. Shielded type 316 ball bearings.
4. All parts either 316 S.S. or pure aluminum – natural electrical ground – no plastics.
5. Gravity compensator for product change.
6. Built to API Standard 2500 for custody transfer.

FIG. NO. **2500RC**

"Varec" Fig. No. 2500C is designed for gauging liquid level of chemicals stored in high pressure spherical tanks. Gauge head has heavy carbon steel flange to permit bolting for high pressure service.

"Varec" Fig. No. 2500CR is an inverted design of the Fig. 2500C, permitting its use on all tanks, below or above ground, where top readings are required. Stainless steel tape connects from gauge head to float in a straight line, eliminating use of sheaves and brackets, thus reducing friction and promoting greater accuracy.

Both types are available in two operating pressure ranges: 150# p.s.i.g. and 300# p.s.i.g. These are only two of a wide variety of "Varec" Automatic Tank Gauges. All are designed to be combined with "Varec" Electronic or Pulse Code Telemetering equipment, remote gauging, temperature transmission, automatic tank switching, and remote controls.

Send for "Varec" Bulletin CP-3007 for information on the entire line of gauging equipment.

961.15

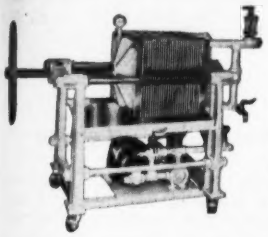
THE VAPOR RECOVERY SYSTEMS COMPANY
"Varec"
Compton, California, U. S. A.
Cable Address: Varec Compton Calif., (U.S.A.), All Codes

When inquiring check 6004 opposite last page

ERTEL EQUIPMENT SERVES The CHEMICAL PROCESSING Industry

ERTEL MODEL EFS FILTER

Designed for use with any type filtering medium. Uses 10 to 40 filtering surfaces 12"x12" square. Filter media creates its own gasket, thus rubber washers are eliminated. Nickel plated bronze or all stainless steel circulatory passages.



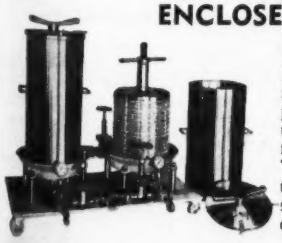
EU MODEL UTILITY FILTER

Comparison and operation records prove this 16" square filter unmatched in performance. Fully described in catalog. Ask for your copy.

ERTEL ASBESTOS FILTER SHEETS

Available in ten uniform grades for all filters up to 25" square. Manufactured under rigid control, they are acid treated to meet Ertel standards of low leachable calcium and iron content. As a double check, these pads are analyzed periodically by an independent laboratory . . . reports of these tests are available at any time. A complimentary set-up of these pads for your present filter is available upon request.

ECD MODEL ENCLOSED DISC FILTER



Incorporates the outstanding feature of independent closing of filtering elements thus providing a positive seal. A unit built by engineers for trouble-free operation. Twin cylinder unit illustrated—also available with single cylinder for smaller capacities.

ERTEL ENGINEERING CORPORATION
KINGSTON 3, NEW YORK
Branch Office & Showroom Located in New York City
COMPLETE LINE OF *Liquid Handling Equipment*

When inquiring check 6005 opposite last page

NEW LITERATURE

Nuclear radiation info

Descriptions of radiation testing of materials, radiation effects, and damage evaluations, are contained in 12-page bulletin. Use of nuclear radiation in industry, and design and installation of cobalt facility are included. Nuclear radiation bul — Radiation Applications Incorporated, Dept. CP, 342 Madison Avenue, New York 17, N.Y. Check 6005A.

Surface-active agents

Technical data on seven types of Aerosol surface-actives offered in commercial quantities are presented in 56-page bulletin. "Aerosol Surface Active Agents" — Manufacturers Chemicals Dept., American Cyanamid Co., Dept. CP, 30 Rockefeller Plaza, New York 20, N.Y. Check 6006.

Stainless steel fittings

Specifications, as well as construction and design details and features, of stainless steel corrosion-resistant fittings are contained in 22-page bulletin. "Speedline" fittings cat — Horace T. Potts Company, Dept. CP, Erie Avenue & D St., Philadelphia 34, Pa. Check 6007.

Hand pallet truck

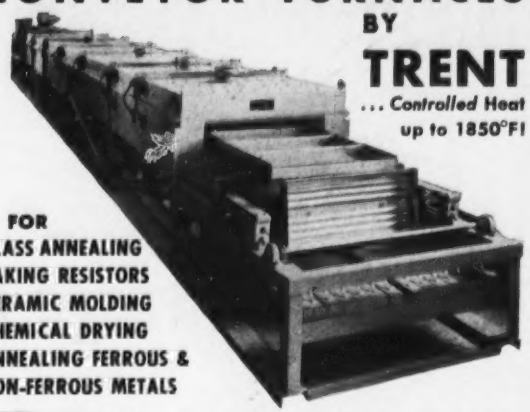
Recent changes and improvements in manufacturer's one-ton capacity hydraulic hand pallet truck are illustrated in two-page bulletin. Applications for truck are suggested. Bul 226 — The Raymond Corp., Dept. CP, 57-150 Madison Ave., Greene, N.Y. Check 6008.

Jar rolling machines

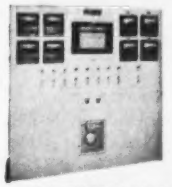
Bulletin of eight pages describes and illustrates jar rolling machines for wet or dry grinding, pulverizing, and mixing of chemicals, colors, pigments, slips, and other materials. Cat 79 — Abbe Engineering Co., Dept. CP, 50 Church Street, New York 7, N.Y. Check 6009.

CONVEYOR FURNACES BY TRENT

... Controlled Heat up to 1850°F!



FOR
GLASS ANNEALING
BAKING RESISTORS
CERAMIC MOLDING
CHEMICAL DRYING
ANNEALING FERROUS & NON-FERROUS METALS



Trent Furnace approximately 50 ft. long utilizes Trent "Folded-and-Formed" heating element in ceramic insulators inserted in refractory insulation. Provides the greatest radiating surface per square inch of element cross section of any electrically heated conveyor furnace! Permits *positive* temperature control—from hot to cool. Equipped with complete controls and control panel where desired.

703

LET TRENT ENGINEERS CUSTOM-DESIGN the conveyor furnace to meet your job requirements. Trent "Folded-and-Formed" heating elements can mean trouble-free service . . . *wherever* controlled, high-temperature heat is required. Contact a Trent representative for engineering service—or write for Bulletin 75-TC.

TRENT INC.
Electrically Heated Industrial Equipment
247 LEVERINGTON AVE., PHILA. 27, PA.

When inquiring check 6010 opposite last page

SAVE AIR AND GAS ...with this meter!

Completely self-contained, self-operated BUILDERS SHUNTFLO METERS can be installed right in your pipeline to check air and gas usage. These direct-reading, easy-to-install meters are available for 2" to 14" lines.

Send for your colored, illustrated copy of Bulletin 400-J10A. **Builders-Providence, Inc., 487 Harris Ave., Providence 1, R. I.**

BUILDERS-PROVIDENCE DIVISION OF **B-I-F INDUSTRIES** METERS FEEDERS CONTROLS

When inquiring check 6011 opposite last page

MOUNTING GLAND
Eliminated
ON
CHEMPRO "wedge-lock"
mechanical
seals
The Chempro line of external "wedge-lock" seals does not require a mounting gland, or any modification to the stuffing box, to align and hold the Chempro seal in position. The patented "wedge-lock" design automatically seats the seal stator in the stuffing box in perfect face-to-face alignment with the seal rotor on the shaft. Simple and easy to install—in only 20-30 minutes.
OTHER ADVANTAGES
• Completely Interchangeable with Packing
• Simple in Design—Only 8 Parts
• Chempro Teflon* Shaft Packing—Chemically Inert
• External Seals Adjustable After Installation
• Parts Interchangeable Between Seal Styles
• External and Internal Seals Available—From Vacuum to 100 psi
Write for Bulletins CP551 and CP575.
CHEMICAL & POWER PRODUCTS, INC.

When inquiring check 6012 opposite last page

NEW LITERATURE

Asbestos textiles selector

Reference manual of 16 pages contains all information necessary to guide selection of asbestos textiles for any application or temperature range. Products covered include cloth, tape, tubing, lap, roving, cord, wick, and rope. Products uses are illustrated. Bul 76-327—Union Asbestos & Rubber Co., Dept. CP, 1111 W. Perry St., Bloomington, Ill. Check 6013.

Hi-transfer exchangers

Equipment for promoting high heat transfer at minimum pressure drop is described in four-page bulletin. Bul 170 — The Whitlock Manufacturing Co., Dept. CP, West Hartford 10, Conn. Check 6014.

Automatic drive tractor

Advantages of automatic drive industrial tractor with drawbar pull rating of 750 lb. are pointed out in two-page bulletin. All components are thoroughly described, and specifications listed. Form 1479A—Hyster Company, Dept. CP, 2902 N.E. Clackamas, Portland, Oregon. Check 6015.

Viscometer data

Advantages, process requirements, design features, and typical installations of process viscometer and its applications to end point determination of polymerization reactions are explained in detail in four-page data sheet. Data sheet 020 Viscometran—Brookfield Engineering Laboratories, Inc., Dept. CP, Stoughton 112, Mass. Check 6016.

Concrete floor coating

Uses for fast drying liquid protective coating for concrete floors are described in four-page bulletin. Bul BP 1057—Sonneborn Sons, Inc. Dept. CP, 404 Fourth Ave., New York 16, N.Y. Check 6017.

Aromatics, colors, oils

Pocket-size catalog of 38 pages describes essential oils, aromatics, and certified colors. Market information and prices are included. Price catalog 1957 — Dodge & Olcott, Inc., Dept. CP, 180 Varick Street, New York 14, New York. Check 6018.

Consulting services

Revised, 6 x 9″, 136-page book is valuable guide for finding right consultant to solve problems of manufacture, process improvements, research and development, plant designs, and analytical and testing work. Handy classifier and index of this management tool permits location of information quickly and easily. To obtain "Consulting Services" 1957, remit $1.00 direct to Assn. of Consulting Chemists & Chemical Engineers, Inc., Dept. CP, Room 82, 50 E. 41st St., New York 17, N.Y.

Dust collector cleaning

How proper water treatment can increase efficiency of wet-type dust collectors is described in two-page bulletin. Case histories show how six manufacturing plants cut clean-out time and protected their equipment at low cost. Bul WDC — The North American Mogul Products Company, Dept. CP, Standard Building, Cleveland 13, Ohio. Check 6020.

Engineering aptitude?

Do you have engineering aptitude? You may find out by consulting eight-page booklet by Dr. A. Pemberton Johnson, Testing and Guidance Division, Newark College of Engineering. Containing set of questions, answers, and interpretations of answers, booklet should be helpful to young men 16 to 25 in checking on engineering and scientific aptitude. "Do I Have Engineering Aptitude" — Dr. Frederick A. Russell, Meetings Secretary, Newark College of Engineering, Dept. CP, 367 High St., Newark 2, N. J. Check 6021.

Pulp bleaching book

Comprehensive 60-page book presents data on pulp bleaching. Book contains 52 illustrations showing process flow sheets, diagrams of equipment, and graphs of useful data. Among subjects covered are pulp bleaching stages, procedures and systems, and several common methods of producing chlorine dioxide. To obtain bul 200, send letterhead request to Hooker Electrochemical Company, Dept. CP, Box 344, Niagara Falls, N. Y.

PVC plastic pipe data

Bulletin of eight pages tells story of PVC plastic pipe and presents technical data on manufacturer's product. Physical properties, maximum operating pressures-temperatures charts, and flow rate charts of rigid PVC plastic pipe are included. Form KT-11-56—Kraloy Plastic Pipe Co., Inc., Dept. CP, 4720 E. Washington Blvd., Los Angeles, Calif. Check 6022.

WANT MORE INFORMATION . . .

. . . about things you read about in the New Literature Section?

Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.

Refinery waste disposal

Possible pollution of atmosphere by gases and particulate matter is covered in 70-page manual on disposal of refinery air-borne wastes. Sources, classification, properties, control, collection, and treatment of contaminating gases and particulate matter; disposal of particulate matter; combustion of gases in furnaces; smokeless flares; dispersion of gases from stacks and flares; and air-pollution surveys are included. To obtain Vol II, "Waste Gases and Particulate Matter", remit $1.50 direct to American Petroleum Institute, Dept. CP, 50 W. 50th St., New York 20, N.Y.

Fire protection

Discussion of nature and advantages of fire protection systems is contained in 36-page bulletin. Insurance savings and other economic benefits which fire protection makes possible are explained. Bul 66 — "Automatic" Sprinkler Corporation of America, Dept. CP, Youngstown 1, Ohio. Check 6023.

Urethane data

Properties, reactions, and uses of urethane are presented in six-page tech bulletin. Bibliography is included. Tech Bul 5—Organic Chemicals Div., Food Machinery & Chemical Corp., Dept. CP, 161 E. 42nd St., New York 17, N.Y. Check 6024.

Control valves

Bulletin of 12 pages describes and illustrates manufacturer's line of air and hydraulic control valves. Bul 571 — C. B. Hunt & Son's, Inc., Dept. CP, Salem, Ohio. Check 6025.

Describes pressure filter

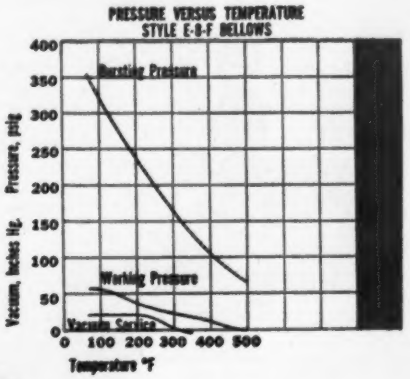
Design, construction, operation, and advantages of batch pressure filter are described in four-page bulletin. Bul 7400 — Dorr-Oliver Incorporated, Dept. CP, Stamford, Conn. Check 6026.

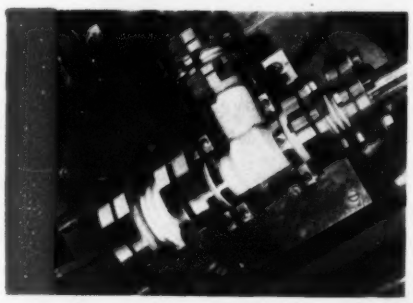
DORÉ INTRODUCES NEW QUALITY CONTROL CHECKS AND CHARTS TO ASSURE

OPTIMUM SAFETY AND PERFORMANCE

OF BELLOWS and FLEXIBLE COUPLINGS OF TEFLON* — EXPANSION JOINTS WITH TEFLON LINING

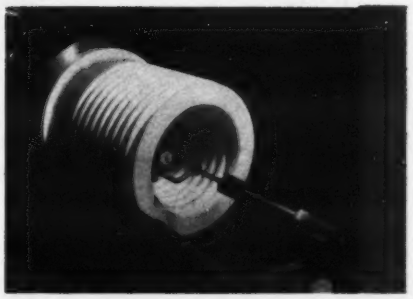
1. ***For the first time in the industry*** **pressure-temperature charts showing recommended operating pressures and actual burst pressures are furnished with each Doré Bellows and Flexible Coupling of Teflon, and Expansion Joint lined with Teflon. This confirms our pretesting — takes the guesswork out of operating conditions.**





2. ***For the first time in the industry*** **each Doré Bellows and Flexible Coupling of Teflon, and Expansion Joint lined with Teflon, is cycled with cold water at pressures 50% greater than recommended operating pressures prior to shipment.**

3. ***For the first time in the industry*** **Doré's Bellows and Flexible Coupling of Teflon, and Expansion Joint lined with Teflon are gauged for uniform wall thickness of each convolution at time of manufacture. This eliminates variation of wall thickness — the major cause of bellows rupture.**



*DuPont's tetrafluoroethylene resin

IT PAYS TO GET DORE' QUALITY CONTROLLED SHAPES OF TEFLON

John L. Doré, Co.

SALES AGENTS IN U.S.A. FOR JOHN L. DORE, INC.
Du Pont's Teflon • Kellogg's Kel-F Hi-Quality Nylon

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When inquiring check 6027 opposite last page

FLETCHER *TORNADO*

THE CENTRIFUGAL WITH FULL AUTOMATION

Bottom Discharge Tri-Point Centrifugal

Bottom Discharge →

CUT PRODUCTION COSTS IN HALF — The Fletcher Tornado needs no operators. It's fully automatic, gives you 24-hour production. You're certain of quality control of your product because of the uniform load and the unvarying consistency. Compare these features.

Uni-Construction—Entire centrifugal—basket, curb, drive and accessories oscillate as a unit.

Bi-Ball Swivel — Dual ball and socket on each of the three steel balancing stands assure smooth oscillation.

Tri-Point Suspension—Scientifically positioned to provide positive, effortless balance of the entire centrifugal.

Also available in manual and semi-automatic models.
F/M variable drive • Zero to maximum RPM

The New *Fletcher Works, Inc.* CENTRIFUGAL DIVISION

2nd & Glenwood Avenue • Philadelphia 40, Pa.

Send me additional information on the Fletcher Tornado Centrifugal

NAME & TITLE

COMPANY

ADDRESS CITY & STATE

C-1

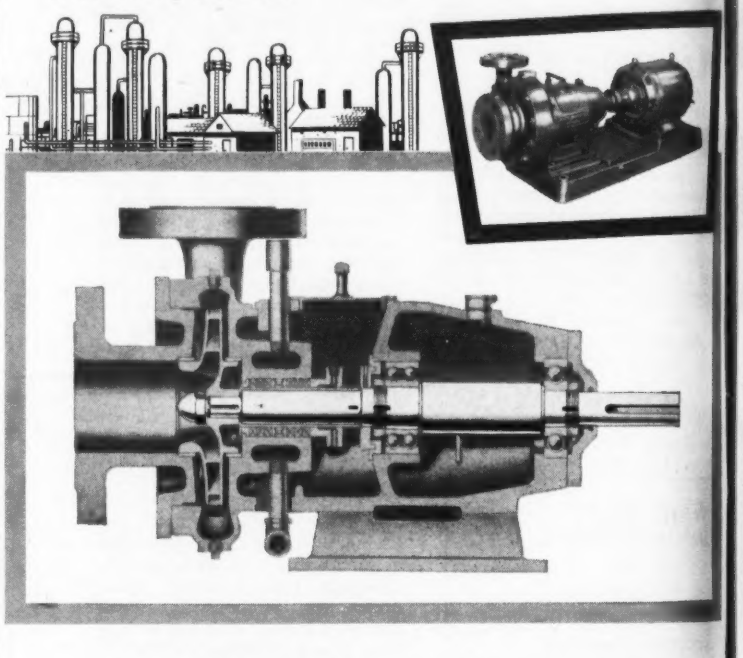
When inquiring check 6028 opposite last page

HOW! PUMP USERS!

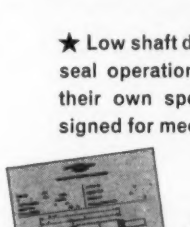
Low Shaft Deflection Means Less Down Time

★ Reduce packing and bearing problems with Dean Brothers centrifugal pumps which are engineered for top performance at 3500 RPM.

Large shaft diameters with short overhang minimize deflection, reduce packing wear and avoid metal-to-metal contact within pump at close running clearances.



★ Low shaft deflection is a must for satisfactory mechanical seal operation. Dean Brothers seals are manufactured to their own specifications. Both pumps and seals are designed for mechanical reliability.



The Best is our Standard

Calculation forms which will aid process engineers in determining pump shaft deflection are available from Dean Brothers Pumps on request.

DEAN BROTHERS PUMPS INC.

EST. 1869

323 West 10th St., Indianapolis 7, Ind.

When inquiring check 6029 opposite last page

• Munson Mixers will quickly blend various chemical compounds into a homogeneous, accurate mixture, no reduction in particle sizes • They blend powders and granules • Spray pipes may be installed to spray liquids on dust and granular materials • Internal vent pipe to expel toxic fumes • Drum may be heated or cooled • Granular fertilizers can be coated with insecticide dust • Will blend chemicals, fertilizers, insecticides, herbicides, antibiotics, and many other materials • Available in several models • Low horsepower • 20 to 250 cu. ft. mixing capacity

TELL US YOUR MIXING PROBLEMS . . . write or phone for the complete story on Munson Rotary Batch Mixers.

MUNSON MILL MACHINERY COMPANY
Dept. P-957 210 Seward Ave., Utica, N.Y.

When inquiring check 6030 opposite last page

NOW...A PIPE JOINT COMPOUND FOR DESTRUCTIVE FLUIDS, GASES and TOXICS

For pipe joints, plugs, all types of threaded connections, screwed fittings and flanges—alloys such as stainless steel and monel, nonferrous metals such as aluminum, also plastics, synthetic rubber and carbon.

Eliminate dangerous leakers and loss of expensive fluids with "John Crane" Chemlon® Pipe Joint Compound. You'll find it the safe and sure answer to your most difficult pipe sealing problems.

Chemlon Pipe Joint Compound is recommended for the most destructive services encountered in industry. Compounded from a chemically-inert DuPont Teflon base, it permits positive handling of practically all known acids, corrosives, alkalis, solvents, biologicals, gases and toxics at temperatures to 212°F. It is without substitute for severe or hazardous conditions.

Order a 2-oz. trial jar. Request Bulletin PLS 515 for further details.

CRANE PACKING COMPANY
6421 Oakton St., Morton Grove, Ill. • In Canada: Crane Packing Co., Ltd., Hamilton, Ont.

When inquiring check 6031 opposite last page

NEW LITERATURE

Suggestion-plan guide

Guide of 24 pages defines and outlines policies and procedures used in installing and administering an employe suggestion system. Objectives, administrative policy, organization and functional responsibilities, processing of suggestions, and promotion of plan are outlined.

To obtain "Suggestion Plan Guide" remit $1.50 direct to Society for Advancement of Management, Dept. CP, 74 Fifth Ave., New York 11, N.Y.

Screw conveyor bulletin

Features and specifications of stainless steel screw conveyors are listed and shown in two page bulletin. Screw conveyor bul — M-H Standard Corporation, Dept. CP, 517 Communipaw Ave., Jersey City 4, N.J. Check 6032.

Specific-gravity device

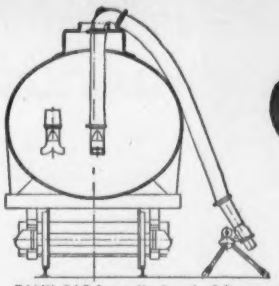
Instrument which supports interchangeable hydrometer vessels in accurately vertical position on swinging arm is described in two-page bulletin. Form 2G756 — Royco Instruments, Dept. CP, 720 Arthur St., Albany, Calif. Check 6033.

Production of plastic foams

Operation of machine for production of polyurethane plastic foams is described in four-page bulletin. Polyurethane plastic foam bul — Gabriel Williams Co., Inc., Dept. CP, 77 Mill Rd., Freeport, Long Island, N.Y. Check 6034.

Coatings periodical

Illustrated periodical contains articles about marketing of resins for surface coatings, new coatings applications, and recent technological developments. A series "Coatings Parade" — Bakelite Co., Div. of Union Carbide Corp., Dept. CP, 260 Madison Ave., New York 16, New York. Check 6035.


TANK CAR is easily freed of fumes for workers' safety.

CHEMICAL STILL is here ventilated while being repaired.

KEEP AIR FRESH
in confined places with COPPUS
Design "A" Ventilator

Improve workers' safety — health — comfort — efficiency. Get rid of dangerous gases, fumes, stagnant air. Coppus Design "A" Ventilator ventilates tanks, tank cars, drums, vats, underground cable manholes, pipe galleries, airplane wing compartments, fuselages. For complete information, write Coppus Engineering Corporation, 389 Park Ave., Worcester 2, Mass. Sales Offices in *Thomas' Register.*

Other "Blue Ribbon" Products in *Chemical Engineering Catalog, Refinery Catalog, Best's Safety Directory* and *Mining Catalogs.*

ANOTHER COPPUS "BLUE RIBBON" PRODUCT

When inquiring check 6036 opposite last page

Specify SQUARE D Motor Starters for 3 Important Reasons

Easy to Wire!
Easy to Get At!
Easy to Live With!

Write for Bulletin 8536. It tells the complete story.
Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wis.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY

When inquiring check 6037 opposite last page

A FLUSH BOTTOM VALVE that WILL NOT CLOG UP!

Designed for Chemical and Pharmaceutical Industries

Strahman

RAM TYPE

Drain Valves

The Strahman Drain Valve is the only valve that cannot clog up. It is so designed that in the closed position the piston or ram extends up into the tank thus preventing any possibility of the outlet becoming plugged.

In the open position, full and unobstructed flow is assured as the piston is drawn down into the bonnet leaving a completely open passage for the material passing through.

Write direct for complete catalogue

STRAHMAN VALVES, INC.
16 HUDSON STREET
NEW YORK 13, U.S.A.

When inquiring check 6038 opposite last page

NEW LITERATURE

Contact meter-relay data

Catalog of 40 pages describes contact meter-relays that indicate and control almost any physical or chemical condition that can be detected electrically. Cat 4-C — Assembly Products, Inc., Dept. CP, Chesterland, O. Check 6039.

Details car unloader

Pneumatic conveying system for rapidly unloading cars of dry pulverized and granular materials is detailed in four-page bulletin. Bul 174 — Sprout, Waldron & Co., Inc., Dept. CP, Muncy, Pa. Check 6040.

Mixing, homogenizing

Catalog of 24 pages describes manufacturer's line of wet mixing and homogenizing equipment. Cat 600 — Gifford-Wood Co., Dept. CP, Graybar Bldg., New York 17, N.Y. Check 6041.

Feeder for chemicals

Air- or water-operated diaphragm feeder designed to handle concentrated chemicals more safely is described in two-page bulletin. Bul 1913 — Proportioneers, Inc., Dept. CP, 345 Harris Ave., Providence, R.I. Check 6042.

Micro-fine filtration

Technical data on use of manufacturer's filter tubes for micronic clarification of liquid chemicals at various temperatures are presented in six-page bulletin. Bul AFD50-1B — Commercial Filters Corp., Dept. CP, 2 Main St., Melrose 76, Mass. Check 6043.

Liquid-level switch

Information on construction, operation, applications, and specifications of manufacturer's liquid-level switch is contained in two-page bulletin. Bul 381-1—Robertshaw-Fulton Controls Co., Dept. CP, 401 N. Manchester Ave., Anaheim, Calif. Check 6044.

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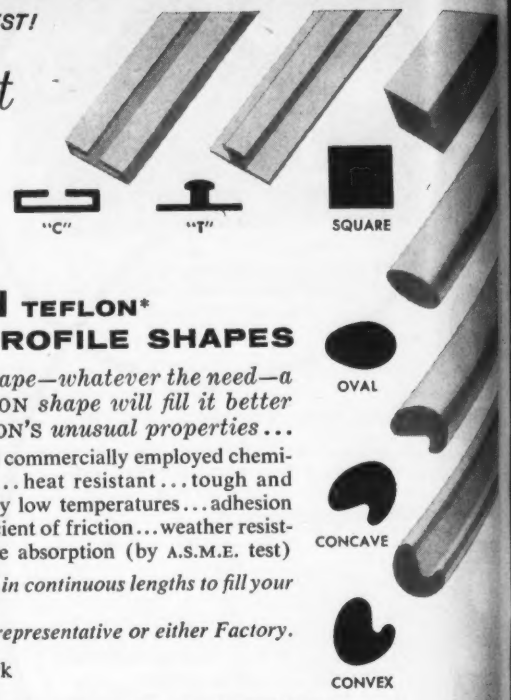

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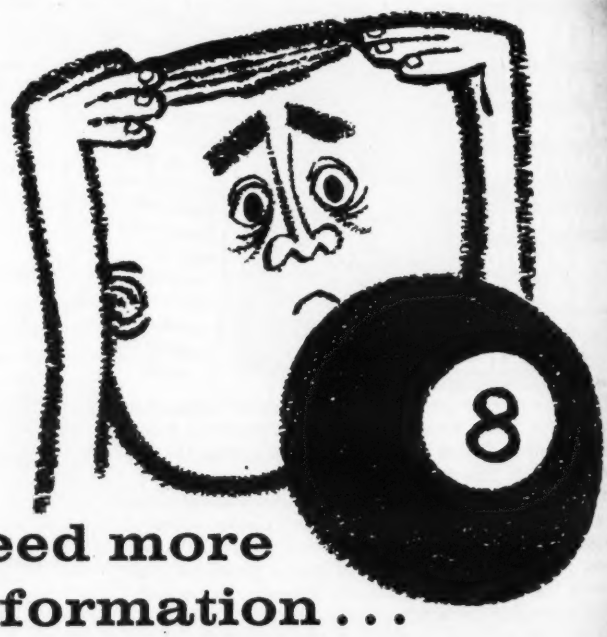

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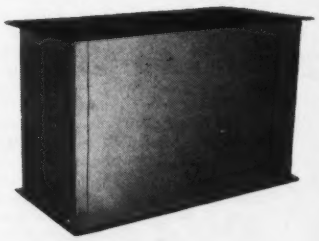

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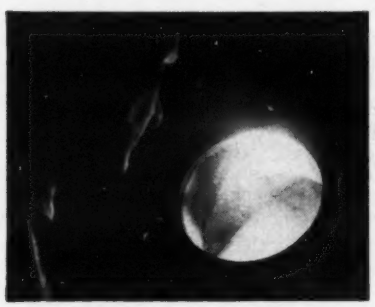

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THE AUTOMATIC PLANT — *A CP Panel Report*

Starts on page 42

equipment available and how a system works.

What About Maintenance?

DIEBOLD: What about the question of maintenance?

SPERRY: Part of the problem is developing a supply of trained people for maintenance. Recently, during some congressional hearings on this very same problem it became obvious that the armed services were supplying a large number of technicians. Estimates have been made as high as two hundred thousand a year.

The armed services have been spending a great deal of money to train these men and losing them immediately to industry. Some people consider this a waste and that the armed services should curtail this training effort. It was pointed out that this movement could be very harmful to industry and to the entire defense effort.

In my own company as many as 90 percent of our technicians received their first training in the armed services. They did not get their entire training in the armed services, but they never would have become electronic technicians without those first courses. So the first important thing is to have a supply of people with the necessary background.

HURD: IBM recently completed a survey at the request of the IRE on the number of maintenance people required for an electronic data processing installation. In 1953, we were of the opinion that graduate electrical engineers were necessary. Indeed, we believed that we had to have five or six associated with each big machine. Today, sixty percent of the people servicing these large machines are not graduate engineers.

Now we encourage customers to operate the machines unattended. The reason is that we have learned how to do preventive maintenance. The machines are much better than they were.

BISHOP: Our records (at Beckman) show the same thing. It is an advantage to the user for the manufacturer to have control of maintenance in the field.

DIEBOLD: Has IBM consciously endeavored to develop a professional level of maintenance personnel?

HURD: Yes. But we prefer to work with people having previous experience in radar and radio, or with a technical school background.

JOHN JOHNSTON: Dr. Hurd, You have indicated there is a definite trend toward completely unattended operation. Is there any premium for keeping equipment running 24 hours a day? If not, a shutdown period once every 24 hours would make it possible to do maintenance work. Would you urge your customers to leave a machine unattended overnight with only one or two maintenance people available during the day?

HURD: We encourage large-scale computer users to operate the machines unattended, following a period of preventive maintenance. The experience of these users indicates that it is a valid decision.

'On Process' Computers

GROHSKOPF: Dr. Hurd, will "on-process" control require an inherently different computer design than is available today? Will the "plant" computer be more compact than the "704" now available? Will it be transistorized, for example?

HURD: In the first place, we are guessing that it will be two to five years before you will need a "plant-size" computer. But, in that time we will have small computers of the kind needed. What we as manufacturers, must do is to not only make them so they will be much more rugged than they are today, but much less expensive.

SPERRY: Why do you emphasize the space requirements? Why is it necessary that they be small if they are to be used in the plant?

GROHSKOPF: It is desirable to house the computers in the control room of a plant. The units should fit right with the panel equipment currently being used. Also, I think that it will not be as expensive to make small computers as it is to make large ones. However, this is an intuitive judgment.

HURD: The whole experience in the computing field so far is that the problems studied have not yet been formulated sufficiently well. Initially, most people will want a general purpose computer to carry on experimentation and development work. At the present time a special-purpose computer cannot be justified. Secondly, the best computer we have today will run a few hours without an error of any kind in any part of the system, including input and output. During this time, we will process several hundred million operations.

JOHNSTON: Do customers have difficulty in defining adequate reliability and accuracy?

Frequently the people who sponsor and advocate use of computers cite the high accuracy available. But in many cases this high degree of accuracy is completely ridiculous when contrasted with the problem requirements.

GROHSKOPF: The answer is: What are the needs of the process? What will satisfy the user? What form of control must be used to allow a decision?

In addition, we must develop a sense of what calculations are necessary to control a specific process. Also, we must have the ability to change the computer programming.

SPERRY: The need for reliability is frequently exaggerated because there is confusion as to the function of the computer in the automated plant. It does not replace the input controllers, that regulate the flows, pressure, levels, etc., and it need not be tied into them so intimately that it will upset the process if it malfunctions.

It may not be tied to the process at all in most cases, and may merely instruct an operator how to optimize his operation. Such a "master" computer could be taken off the line for a few hours, occasionally with no further disturbance than a loss of operating efficiency. The plant could stay "on stream" and continue to produce just as it does today, without the computer.

JOHNSTON: What will be the form of the final instrument system, including computer?

SPERRY: The complete plant will include all of the so-called "Input" controllers that we use today, plus some sort of supplementary master controller, which will include the data processing system and the computer. The input controllers, pressure, flow, etc., will keep the unit on stream, just as they do today, and the "master" will gather together the information about the process, compute the "production variables", the yields, efficiencies, and other quantities that can not be measured directly.

The "master" can be an "on line" computer, but in a complex plant it will not be changing the settings of the input controllers at very high speed. When it is first applied it may only shift the settings every hour or two, or even less frequently. That is why many of us feel that it will suffice to give the information to an operator and let him reset input controllers to optimize the process in accordance with instructions from the computer.

This is a form of "cascade" control, but if the master controller, or computer, is out of service for a while the input controllers keep the plant running and the operator does the best he can to keep product quality up, just as he does now.

If the computer is made automatic and resets the controllers without intervention of an operator, it must be made so that it can not upset the settings too quickly. If

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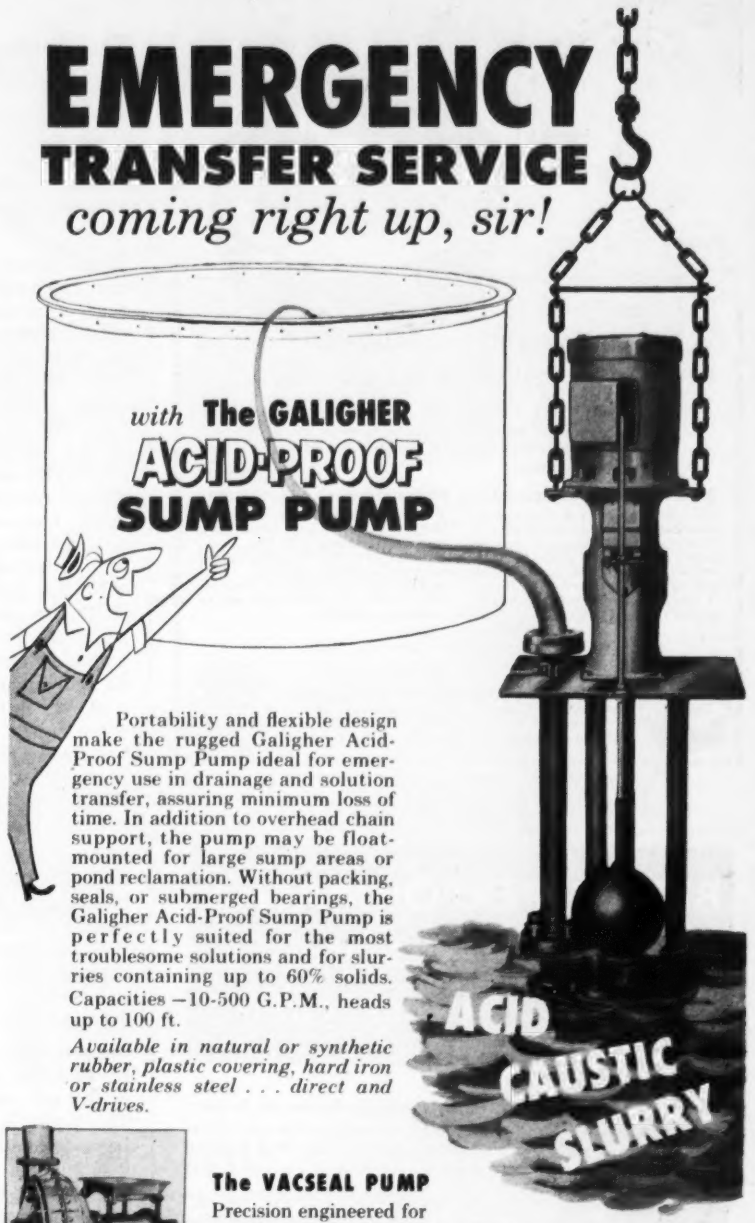

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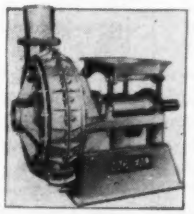

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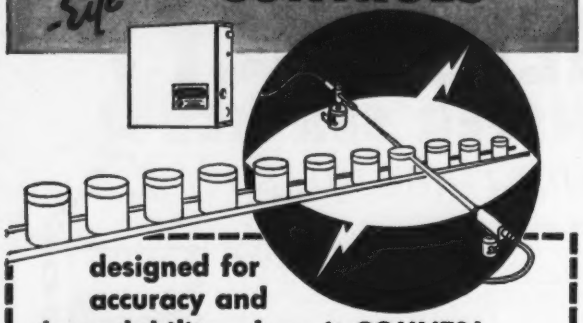

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The Automatic Plant

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anything goes wrong, or if periodic maintenance is needed, the master can be disconnected without disturbance. Manual operation will take over.

BALE: Many operating people are resisting the mechanization of processes because of doubts concerning the reliability of these new instruments. Whatever the cause, whether it be basic engineering, the way the equipment is installed, or poor maintenance reliability, results of the new instruments have been inadequate. Operating personnel do not like being utterly dependent on the new instruments.

In the initial stage of installing a new control system, a failure of a component is amplified out of proportion to its real meaning. It is not the cost of fixing the machine three times, of having somebody available to do that repair. It is the fact that something occurred three times when it was not expected.

THOMAS: The statements about the reliability of the computer bother me. If it is to be the master in this cascade system, the computer should be the most reliable unit of the entire system and require the least amount of servicing.

SPERRY: I did not mean to infer that the computer was not, or did not have to be reliable. The point is that it does not have to operate 3600 seconds every hour, 24 hours a day, 365 days a year, as do our input controllers. A certain amount of "downtime" can be tolerated for maintenance if the system is properly designed. There is no reason why it could not be serviced once a week, or more if necessary, without disturbing the process.

As a matter of fact, the development of static devices, transistors and magnetic cores, may, in the next few years, make this type of equipment more reliable than the typical input controller of today.

THOMAS: One point should be added. Many of our top man-

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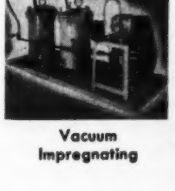

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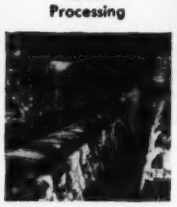

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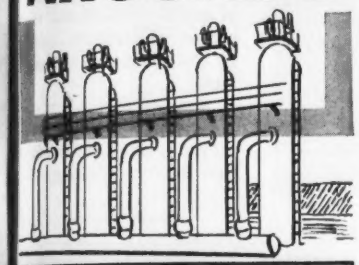

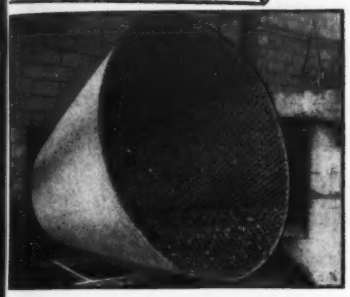

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agement people are getting the wrong idea concerning the use of data reduction and data processing equipment. Top management thinks, "Here is a new automatic control device that can be applied to a plant and will control all variables."

Management may not realize that this new development can only supplement the instrumentation that has been used for years.

SPERRY: Correct. The basic structure of input information and control will remain. But the accounting functions, the production variables, the correlations, these are the province of the new technology. There will always be a "gray" area in which the new controls and the master control will overlap, and this will vary from plant to plant. For example, some of the input controls will also utilize measurements that are needed for accounting purposes, and no two types of processes will treat this matter in exactly the same way. The important thing is that the degree of reliability needed will depend on how the computer is tied in with the input controls.

MCDONALD: Why is it that from the time we began to operate our new plant, everyone was convinced that if a fuse blew all our units would shut down simultaneously? Actually, nothing could be further from the truth. All our "work" controllers are on a graphic panel, completely intact and separate from our information systems, scanners, and loggers. The work controllers can operate separately without use of the information gatherers.

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I would like to re-emphasize, the entire unit can be

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The Automatic Plant

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operated without use of the information systems, the scanners, and loggers, though not necessarily at optimum rate.

DIEBOLD: In drawing this meeting to a close, could we return to the question of availability or non-availability of proper analyzing equipment? What are the manufacturers of instruments doing today to develop the needed end point analyzers.

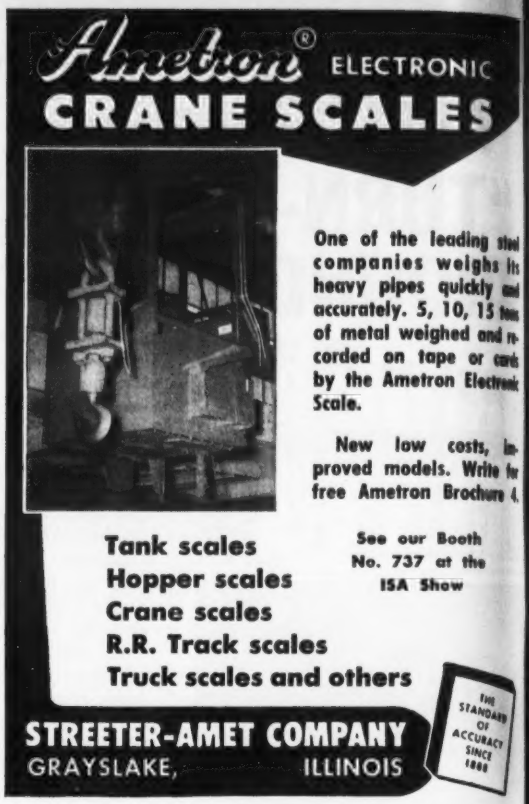
TIVY: Foxboro has offered plant type analyses for some time with original contributions in some, as measurement of moisture content in sheet material. We are continuing this work with even greater emphasis. Seeing the growing need for plant stream analyses — to complement those in the laboratory — we are redoubling our efforts. Evidence of this is our work on chromatography and octane measurements. We recognize the need to improve reliability of analysis instrumentation to encourage greater confidence on the part of users.

SANFORD: The Bristol Company is doing basic work on detection systems. We are working on better means of measuring pressure, temperature, flow, to develop outputs suitable for computers and calculating systems. The new instruments will have better frequency response, and be more accurate and dependable.

JACK ROBACK: Fischer and Porter is working on the problem of better end-point analyzers. I'm not free to state exactly what we are doing other than we do have a team in the research and development group working on this specific problem.

BISHOP: Beckman Instruments has long been interested in this problem of end-point analyzers. Beckman now has a separate, autonomous division concentrating in this field. It has its own research and sales application departments with at least ten field engineers.

We have a philosophy in our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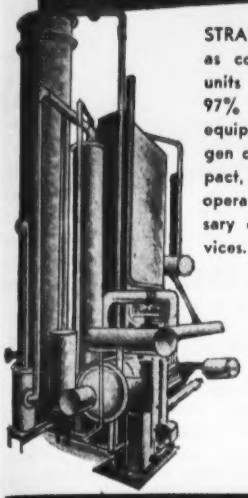
NEW! straub NITROGEN GENERATORS



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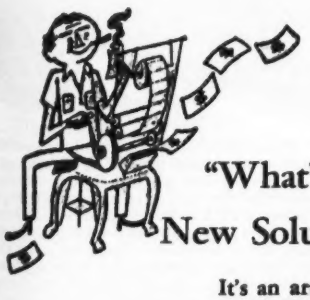

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Take a look at "New Solutions" articles in this issue — they might suggest a "solution" for some of your tough processing problems.

company of over-designing the equipment. We are convinced that the cost of an analyzer is relatively small compared to results obtained if the instrumentation is properly applied. It is more a question of which piece of equipment will work the best.

We are trying to eliminate vacuum tubes completely in our process instruments. We are convinced of the need for complete reliability of operation.

Beckman Instrument plows back approximately 12 percent of its sales dollar into research and engineering. Beckman believes the need is to have a unit that does the job and does it well.

O'HARA: Minneapolis-Honeywell is maintaining basic research in the areas of pressure, and temperature measurement, and, in addition, maintaining contact with manufacturers expert in the development of end-point instruments. We follow the philosophy that in many cases they are much more expert in certain fields than we are.

GILMAN: The position of Taylor Instruments is that our background is in the fundamental measurements, temperature, pressure, and others. We do not believe these fields

Turn to next page

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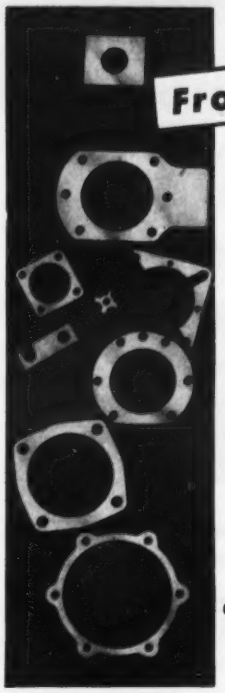

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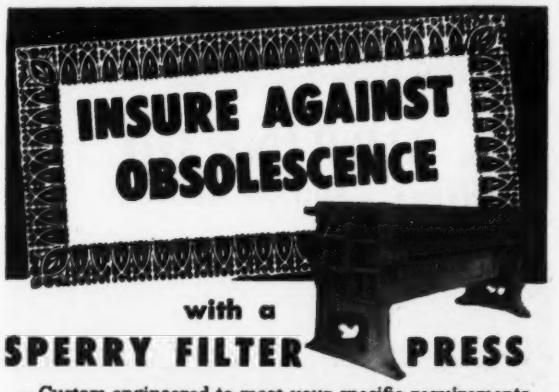

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The Automatic Plant

Starts on page 42

have been completely developed.

Our research groups are constantly working on projects for improving these basic measurements. We are leaving the end-point-type of analysis principally to companies specializing in those fields, and using their primary analytical instruments with our recording and controlling instruments.

Lack of Analyzers

HURD: It was earlier mentioned that the development of end-point measurements was the most important component that is lacking. Does this mean that it is not known how to measure or does it mean that we do not know what to measure?

DIEBOLD: It is a little of both.

HURD: Are operating people unable to measure that which they would like to know?

MCDONALD: That is the general case.

GROHSKOPF: Determining concentration of individual components is one.

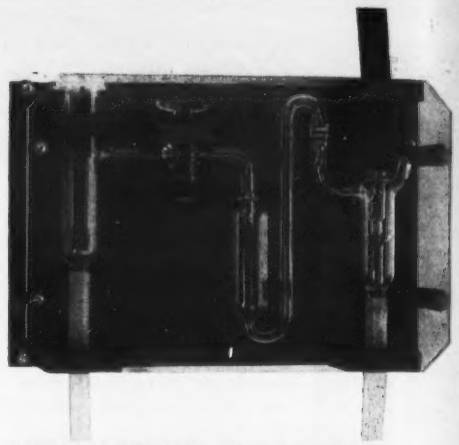
MCDONALD: The oil industry has very simple problems but we do not have answers. We need a flash point controller but none is available. It should be a simple thing to develop one.

HURD: If these qualities could be measured, would engineers know how to combine them to form a judgment as to what should be done with the controls?

MCDONALD: The process is usually something like this: One of the first process control units was a pH controller. It was at first a pH analyzer. It was then found sufficiently reliable to convert into a control. Now many pH controllers are in use.

Instrument Research

TIVY: A very significant point is the trend today of many oil and chemical companies to-



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ward doing their own instrument research. It is becoming more and more apparent that an instrument company cannot do research on analyzers without doing a considerable work in a chemical plant during the experimental phases. Of necessity, operating companies are doing a great deal of this work. But, when a machine is invented, these companies look for an instrument manufacturer because they do not desire to get into the instrument manufacturing business for obvious reasons.

SPERRY: It should be emphasized that the instrument manufacturer will never be able to do 100 percent of the instrument development job. The manufacturer simply cannot do all the required application work.

Another point that should be mentioned is sampling. How can an instrument manufacturer study sampling of a process stream? These are proper fields for the chemical companies rather than the instrument maker.

If an instrument maker develops a color device, the instrument manufacturer cannot tell the chemical manufacturer what a color change means to the chemical being made. That work has to be done by the chemical companies or, in some cases, the universities.

BISHOP: Beckman Instruments has learned that a great deal of money is required to develop end-point analyzers. In addition, it is a very difficult thing to do. That is why we have a completely separate organization to do the job.

SPERRY: Do you think that there is any one instrument company that can tackle the broad job of sampling and correlations? The chemical companies ask this question frequently.

BISHOP: No one company has developed enough skills to do the complete job required by chemical companies — as yet. Even if it does, I think some help will be required from the chemical companies.

SPERRY: So the basic correlations and samplings will remain research fields for the chemical company laboratories.

JACK FROST: Without any question, if an instrument company would develop some of the necessary basic devices there would be no dearth of willingness to develop specific application techniques.

Mr. McDonald mentioned one earlier in which I am interested, measurement of viscosity. I am sure we would consider spending money immediately to find ways to use a new viscosity device. But no one has come out with one.

McDONALD: There are good viscosity devices available but the difficulty is in getting a sample. This is where we bog down.

In practically everything we measure, whether it be pH, oxygen, CO_2, anything that might be mentioned, the crux of the whole problem seems to be sampling and delivering a purified sample to the analyzer. We are not even making use of instruments already developed. ■

Unions Vs. Management

Starts on page 25

doing it — A good many companies will "committee" this one to death, between company economists, the legal department, the finance department, and, last but not least, the president's office. It is perfectly amazing how persuasive many businessmen can be on this kind of a subject until they either try to write it out or discuss it in a prepared speech.

3) *Providing the necessary editorial caliber* — This important kind of thinking and writing calls for editorial skill far beyond the "picnic and bowling team" kind of writing being done in many employee publications today.

4) *Being willing to face up to the fact that material of this kind must be presented forcibly and with conviction* — Labor does not hesitate to

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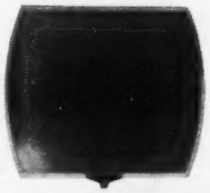

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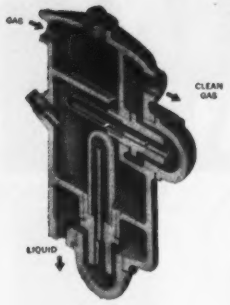

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Unions Vs. Management

Starts on page 25

present only its own side of the argument on many of these economic and political problems. Management may feel that a more objective picture that presents both sides is fairer and perhaps more convincing. Maybe, but that doesn't mean it shouldn't present its own arguments and present them with spirit. Most people, including workers, respect honest enthusiasm. Many like a good battle, even if it's only a battle of words and ideas.

Once management has made the decision to fight this battle with both hands, instead of with one hand tied behind its back, here are a few suggestions that will help management get started:

1) Charge the editor with making this job a part of his editorial plan. After he gets over the first shock, this will be easy. Most editors are crusaders at heart. Each editor has been waiting for an opportunity of really doing the job he thought he was going to do when first hired.

2) Help the editor to get at the facts, but let him see to the writing and editorial work. Remember, he is a professional, or at least he should be. He is being paid to know his publication audience and how to write to them.

3) See that he gets every union publication reaching your people as well as the official national organ of the AFL-CIO. He needs to know what he's up against.

4) Send him to talk to key people in national organizations that are working to tell the story of free enterprise. He needs a working knowledge — a personal point of reference. He needs to know what these organizations are doing, what they have done, what they are publishing. Among these are the US Chamber of Commerce, The National Association of Manufacturers, The National Industrial Conference Board, The Manufacturing Chemists' Association, and others.

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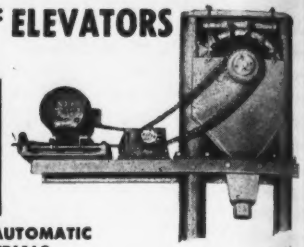

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(Condensed from paper presented at June 1957 MCA meeting at White Sulphur Spring, W. Va.) ■

Technical Men For Sales

Starts on page 33

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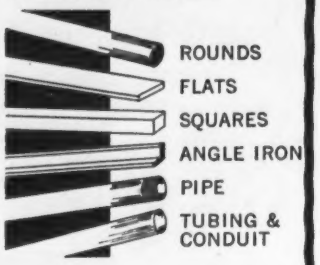

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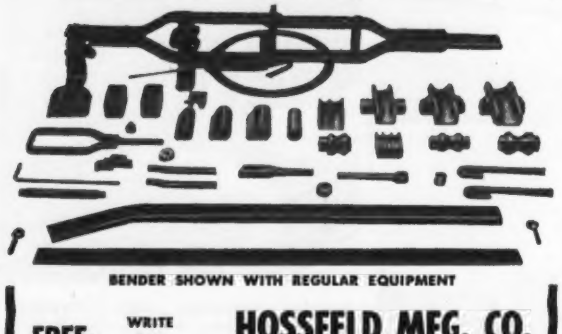

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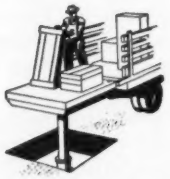

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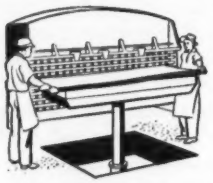

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When inquiring check 6075 opposite last page

Technical Men For Sales

Starts on page 33

cating oil or hair-setting compounds. If he can't — someone else is going to get that fluorocarbon order.

Higher Training — Sometimes Necessary

Another new product (or rather, group of products) introduced by Carbide last year depends on the use of high-purity peracetic acid manufactured by a unique process. Peracetic acid has a variety of uses. Over 300 compounds have been made from it in our laboratories. At present we are developing markets for a number of these compounds in various fields such as stabilizers, pharmaceuticals, and epoxy resins. The technical requirements for the project are so high that we have *two PhD's* on the peracetic sales force.

In the introduction of new products, time is of the essence. The sooner a new product is marketed, the sooner a return on investment can be realized. A man selling a new derivative of peracetic acid must convince purchasing agents and research chemists in customers' laboratories that the new chemical is a useful and economically feasible one. A research chemist is not likely to be impressed by a salesman trained in business administration. He wants to talk to someone in the language of the scientist. More and more purchasing agents, incidentally, now have scientific training.

Carbide's Sales Force

It might be helpful to know a little bit about our sales staff. We have more than 130 field salesmen, and each one of them must know *all* our products. Over and above his college training every salesman receives 12 to 18 months training in all aspects of our business before he begins to make sales calls.

Every six months our salesmen meet for concentrated briefing sessions on the latest technical advances within our

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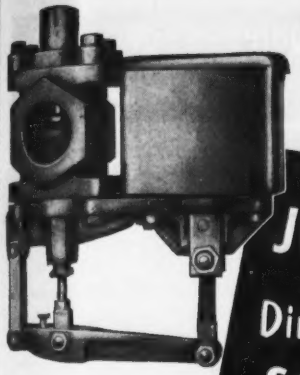

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Low in price, Trouble-free, Easy to install and read

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REPRESENTATIVES IN PRINCIPAL CITIES

When inquiring check 6077 opposite last page

company and in industry in general. A man without technical background could not possibly understand, let alone absorb, the quantity of technical information delivered in the short time of these briefings. In addition, the salesman must read the literature to keep abreast of technical advances.

This is necessary because the technically trained salesman is a creative force within the company. It is he who gets to know the customer most intimately. We rely upon him to tell us what our customers' needs are. His information may help guide the direction of research, technical service, engineering developments. An understanding of technical matters and a basic acquaintance with our own capabilities will enable him to evaluate quickly any information that he obtains. This ability to present the potentialities of a given problem often enables the salesman to save the customer and ourselves much time and money.

Why Not Non-technical Men?

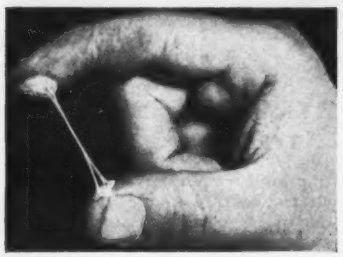
Some people may be of the opinion that all these things could be accomplished and our sales position could still be maintained by the employment of non-technical salesmen. Perhaps they could, but what of the salesman's function as technical consultant? This would still remain to be performed. And who would perform it? A technical man, of course, and a scientist would be required to back up the non-technical salesman. Such an arrangement would not make efficient use of manpower and there would be little or no savings in technical talent. There would be areas of conflict between the salesman and the scientist which would impair sales efficiency, and both the company and the customer would be the loser.

A Waste of Technical Talent?

We are not unaware that good technical manpower is getting harder and harder to come by. We, however, believe

Turn to next page

Lock out those tough LEAKS



Tacky and sticky enough to hold on to any surface. Smooth and creamy in texture . . . not porous or grainy. Sets up a springy elastic seal that seems "alive".

Leak Lock is a special purpose joint sealer designed to solve difficult leaking joint problems in all industries. It has been notably successful in the chemical, petroleum, atomic energy, electronic and refrigeration fields.

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Leak Lock

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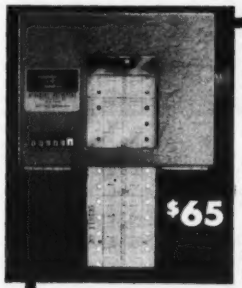
automatic, continuous, operating data can be the difference between Profit and Loss!



Modern plant operation demands the most efficient and accurate means of evaluating both machine and man-power production . . . that's why leading companies everywhere are equipping their production lines, processes, systems and office machines with Time Recorder-Totalizers.

The Time Recorder-Totalizer monitors the operation of any machine, process or system by chronologically recording the time and duration of every "on" and "off" period during each day.

The Time Recorder-Totalizer makes it possible to analyze the efficiency and performance of any type of equipment plus simplifying cost accounting.

The TIME RECORDER-TOTALIZER incorporates the following features:

SPROCKET DRIVEN CHART . . . accurately timed . . . chronologically printed . . . available in speeds from one inch per hour to ten inches per minute . . . 250 linear feet per roll . . . each $1.25.

ELAPSED TIME METER . . . (Time Totalizer) registers accumulated "on" or production time.

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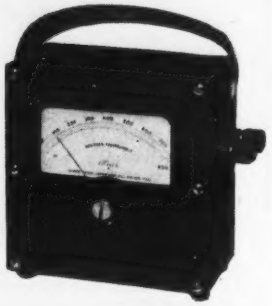
Alnor
PYROMETER
TYPE 1500



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Get full details on the Type 1500 in Bulletin 4434. Illinois Testing Laboratories, Inc., Room 504, 420 N. LaSalle St., Chicago 10, Ill.

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yours free!

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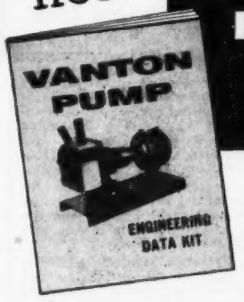
NO STUFFING BOX OR SHAFT SEALS



VANTON PUMP eliminates packing problems in handling corrosive or abrasive liquids. Liquid flows in channel between molded plastic body and synthetic liner. Ideal for lab, pilot plant, and full-scale production use. A full-time production tool in the 1/3—20 GPM range.

ENGINEERING DATA KIT contains sizes, pumping and performance data, body and liner materials, selection chart; typical hookups, prices, operating data—all the info. you will need to solve your pumping corrosion and packing problems.

GET THE FACTS! SEND COUPON!

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Please send further info. on Vanton pumps.
My pumping problem is:
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STREET & NO.
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Technical Men For Sales

Starts on page 33

that the technically trained man can and does make major contributions to our success in areas outside the laboratory or the plant. From the very start, Union Carbide Chemicals Company found it necessary to employ technical men to sell new synthetic organic chemicals.

Dr. J. G. Davidson, former president of our company, left the laboratory to become our first technical salesman. He spent many months traveling around the country talking to people in industry about the discoveries made in our laboratory. Perhaps this could be considered a waste of technical talent, but Dr. Davidson did not think so. He realized that our chemical discoveries had to be made known to industry and translated to large-scale use before they could achieve their rightful potential.

Our business, based as it is on changing chemical processes and new expansions of the frontiers of science, demands that we bring to our customers more than the classic attributes of a salesman. A wedding between the salesman's drive to sell and the technical skill of the scientist is the ideal for which we continually search. We believe that opportunity is great for the young chemist or chemical engineer who combines these characteristics. ■

CHEMICAL PROCESSING's Editors are always interested in the opinions of our readers. What are your views on the subjects we cover each month?

"Over The Reader's Shoulder" (page 12) will publish as many letters each month as is possible. Let us hear from you.

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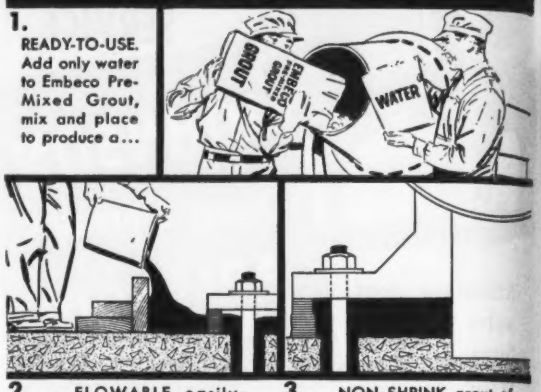

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Corrosion resistant self-supporting plastic structures are designed and fabricated to meet your specific needs . . . complete plastic pipe systems including flanges, valves, and fittings are also available.

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MERTZTOWN, PENNSYLVANIA

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Recruiting Engineers . .

Starts on page 34

ties, practices, products, production methods, and a great deal about where he — the graduate — fits into the organizational structure.

A company can hardly expect to have an adequate schedule of personal interviews arranged by a college or university placement office if it does not provide the necessary information. The name and time of arrival of the representative, the number of days scheduled for interviews, desired length of interviews, etc. The placement office must have such information well in advance of the date of actual interviews in order to make the proper arrangements.

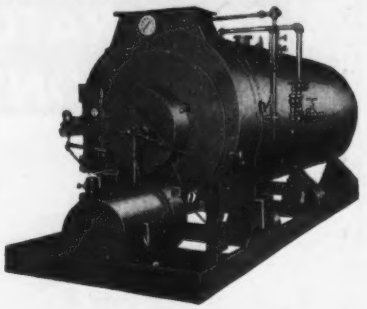
Interviewing companies should provide the placement office with descriptive literature in advance of the interviewing dates. If specially prepared recruiting material is not available, a well-written letter explaining, in some detail, company policies, programs, products, etc., should be submitted. Space limitations on most college campuses preclude team visits from industry. Space demands for psychological testing should not be made unless the placement office has the necessary accommodations.

Cannot Pre-select Graduates

College or university placement offices or faculty members are not in any position to pre-select, upon demand, individual members of the graduating classes for company review. If the graduates were required to attend interviews they would, in most cases, appear under duress. This situation does not have a place in an adequately serviced recruitment program of industry. If the company has recruited consistently, it has built its own reputation which will bring, as a matter of course, interested graduating seniors for interviewing. Companies entering the field of college recruiting must expect, as they would in developing a new product line, to

Turn to next page

want to buy a pound of steam for less money?



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Cyclotherm's two-pass construction guarantees a minimum of 80% efficiency, cuts maintenance costs 30% to 50%. Firetube never needs cleaning. Front and rear assemblies are quickly removed.

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Send me free copy of your booklet, "Cyclotherm Cyclonic Combustion."

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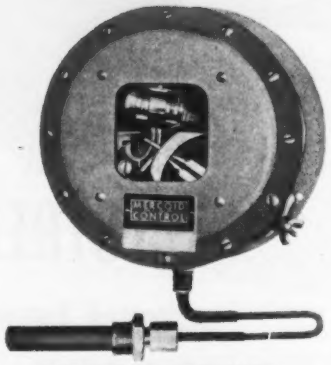

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Recruiting Engineers . .

Starts on page 34

spend some time in cultivation.

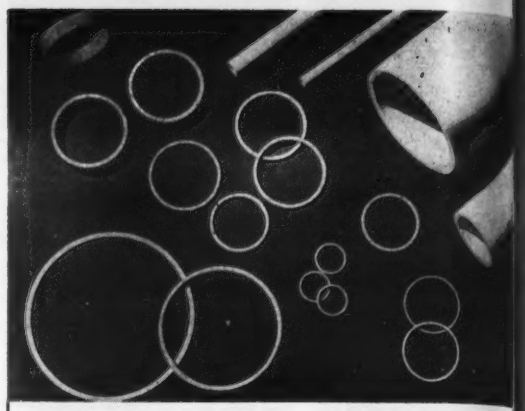
How important is salary?

Is salary important to the engineering graduate? My experience at Illinois Tech, verified by many other college placement officers as well as by many industrial representatives, is that salary does not hold the importance so often assigned to it by new companies in the field or by novice recruiters. As long as the salary being offered is competitive for the industry, in any given year, it will not cause undue concern to the graduate.

Graduating seniors at our college rarely ask the starting salary during the course of a company interview on campus. However, it should be obvious that a salary scale must be competitive in order to sell a graduate on the company, just as prices must be competitive in order to sell the consumer its products. Quality cannot be attracted by being submarginal.

"Well, we can let you have a chemical engineer for the waiver price . . . or we might make a straight player deal . . . we need a good instrument man."

Our thanks to Charles J. Wolfenberger, Pine Bluff Arsenal, Arsenal, Arkansas



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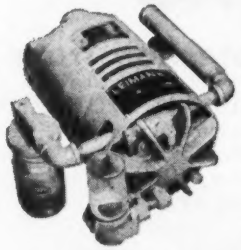

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FEATURES INCLUDE: Steel wings for long wear—automatic wing adjuster—ball bearings—automatic oiler—fan cooling—noiseless operation—automatic thermal overload protection for motor—inlet filter and outlet separator—oil-free air. Plus—famous Leiman dependability and lifetime performance.

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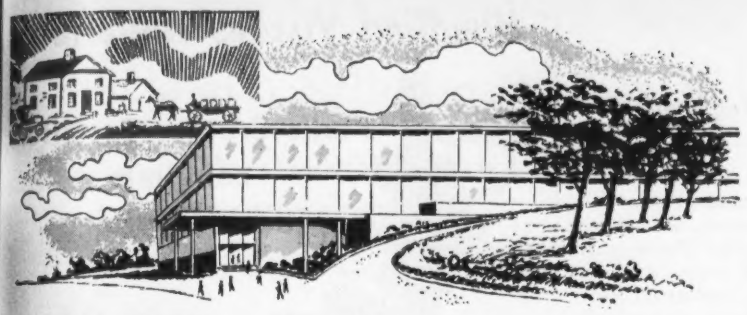

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One Viking does your pumping job from start to finish, requiring low horse power and delivering high efficiency.

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See our Catalog in Sweet's Plant Engineers File

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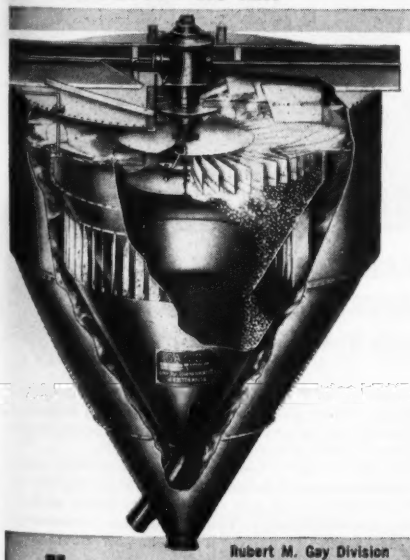

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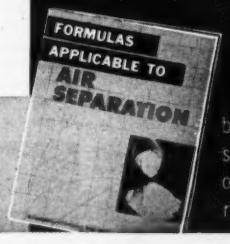

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Plant visits

The period of time normally allotted to this business of primary personal interviewing on the college campus is relatively short. When a degree of interest is evidenced by both student and company, a plant visit is usually the next step. This visit, at the expense of the initiating company, has a dual purpose. It will better acquaint the applicant with the company, its people, and the surroundings. It is understandable that the company as well as the graduate is putting its best foot forward under such circumstances. The company has an opportunity to appraise the prospective employee and test his reactions to environment, permitting a re-evaluation of the opinion gained by the representative on the initial visit to the campus.

Industry should treat plant visits in an objective manner. Although these visits are effective and appealing to both sides, they are time-consuming for both graduate and company. Such visits should be made with the full knowledge of the college placement officer. Copies of all correspondence between company and graduate should be provided for the placement officer. He, as coordinating agent, must know all phases of the negotiating if he is to adequately serve both graduate and company.

College Placement Officer

The college placement officer has come into being on most college campuses to provide impartial information to both graduates and company representatives. He attempts to establish the most favorable circumstances for their meeting. Placement offices are under an obligation to advise the various companies regarding the approximate number of graduates expected to receive their degrees. Full information as to commencement dates, dates available for campus interview, etc., should also be furnished.

Turn to next page

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Petrometer CORPORATION

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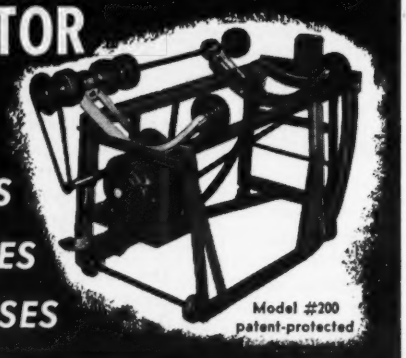
inexpensive MORSE portable ROTATOR



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Recruiting Engineers

Starts on page 34

The general trend is to have centralized placement for all graduating seniors as well as graduate students. There is no better way of providing both graduates and industrial representatives with the most comprehensive services. Valuable time is saved, and much confusion is eliminated. This centralized placement service should be of sufficient stature on campus to take precedent, by agreement, over all departments of the college. It should not act as a barrier between industry and school, since there is an advantage to the graduate when special information can be obtained from members of the faculty.

The centralized placement office acts as a coordinating agent, preventing undue pressures being placed on the faculty by over-ambitious representatives of industry. It also prevents faculty members from re-establishing the "fair-haired boy" type of placement. By organizing what was formerly a most haphazard approach, placement officers have done much toward developing a code of ethics.

Today's graduate should not be thinking in terms of shortages but rather of opportunities. At present, it is normal to have opportunities presented in such a manner as to stimulate the imagination of even the most phlegmatic. The siren call to the engineering graduate sometimes leads him to believe, however, that his working day is made up of constantly new adventures into the glamourous tomorrowland. It is the responsibility of the recruiter to present a realistic picture of the opportunities offered by his company, and to adhere to ethical recruiting practices in all dealings with graduate and school.

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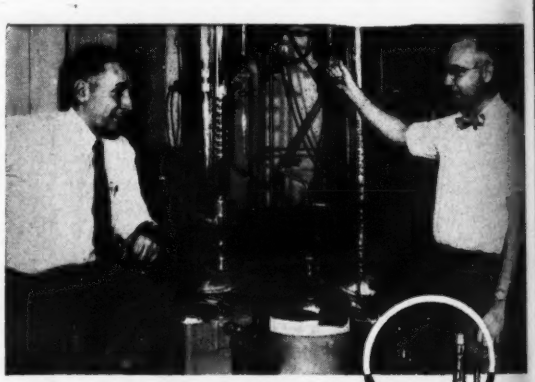

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Other Markal Coatings are available in a complete range of types for any condition and temperatures up to 2200°F. Send for catalog No. MPC. The **Markal Company,** 3055 West Carroll Avenue, Chicago 12, Illinois, telephone Sacramento 2-6085

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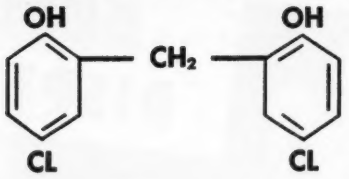

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Future of Water

Starts on page 38

of the wells of the Miami Springs field. An extensive study of ground water resources began. This showed that salt water encroachment could be controlled by adjustable dams in the canal.

The dams are opened during normal and high water levels to allow the canals to drain, and closed during low water to halt inland flow of salt water and to maintain a higher water table.

Some tidal canals are still uncontrolled and many new canals have been proposed both as drains and as a source of fill for reclaiming swampy land as well as to provide access to Biscayne Bay for pleasure boats. Each canal brings salt water inland as far as it extends. Adequate control measures must continue to be taken to guard Miami's ground-water supply.

What Can We Do To Aid This Situation?

We can waste less water and reuse more, thus reducing our net water demand. We can substitute more profitable activities and more efficient utilization of water.

Local areas that are short can often purchase water at a practicable cost.

New methods of solving water problems are constantly being developed. In many cases, the solution involves large expenditures, but as with many other industrial problems, it is only a matter of economics — not lack of know-how.

To keep our water demands within our ability to pay, we must 1) Find how much water we are using and how much there is available. This is a

Turn to next page

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Perhaps you have some opinions on this vital subject of tariffs, along with some well-thought-out ideas. If so, we would like to hear from you. Write to:

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Future of Water

Starts on page 38

big order, as the inventory should be nation-wide.

2) Knowing this, we must study individual problems as they arise so we can solve them early and as inexpensively and easily as possible.

3) Thirty years ago, New Mexico enacted a model law declaring ground water to be state property. Long-term planning and control of development within the framework of state law is needed. Many problems are interstate and require unified control through interstate compacts. In spite of the national importance of our water problems, Federal control is not the answer to them.

If our nation is to have a secure basic economy, we must have a secure water supply on which to depend.

(Highlights from a report presented before the American Society of Civil Engineers, in Jackson, Mississippi, on February 19, 1957.) ■

Plant will use rainwater for industrial use, air conditioning

Next best thing to using no water at all

A good example of what can be done to conserve water in industrial plants will be shown in a new 220,000 sq ft metal fabricating plant going up near Chicago. It will do the next best thing to using no water at all — it will draw all water needed for air conditioning and industrial purposes from rainwater stored in two man-made lagoons.

The system will provide the plant with up to 18,000 gph at a cost of about ½ cent per 1000 gal.

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Rainfall draining off the five acre parking lot, and the five-acre roof area, is collected in the two reservoir lagoons, each 75′ wide, 600′ long, and 5′ deep. Maximum capacity is

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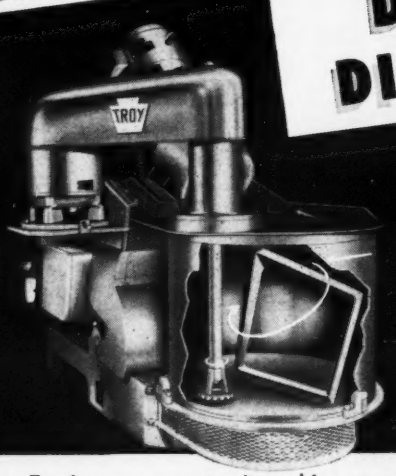

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1.8 million gal per lagoon.

Each inch of rainfall results in a potential 10 inch rise in the reservoirs—or 28,000 gal of water. Since rainwater is the softest available, no treatment is needed before use.

Water drawn from the lagoons for "clean" operations like cooling and heat treating is merely returned to the lagoon from which it is drawn. Water used in such operations as ferric oxide plating will be sent to a holding tank where sediment and heavy wastes will settle out. Water will also be neutralized by chemical means in this tank.

From the tank it will go to a small aerator-type sewerage unit similar to sewage treatment plants used in many small communities. After treatment it will flow to a sanitary lagoon and then back to the two reservoirs. Overflow from reservoirs is also tied to sanitary lagoon resulting in a complete internal water supply and sanitation system.

Water for drinking and other personnel use will be drawn from a deep well on the plant site. Its disposal will also be handled by the small aerator-type sewerage unit.

The plant is being built about 15 miles northwest of Chicago by Flick-Reedy Corporation, producers of industrial air and hydraulic cylinders. It will cost about $2.3 million.

(Aerator-type sewerage unit used in system is manufactured by Yeoman Brothers Company, Dept. CP, 1990 North Ruby Street, Melrose Park, Illinois . . . or for more information check 6105 on form opposite last page.)

READER COMMENTS WELCOMED

Perhaps you have some opinions on this vital subject of tariffs, along with some well-thought-out ideas. If so, we would like to hear from you. Write to:

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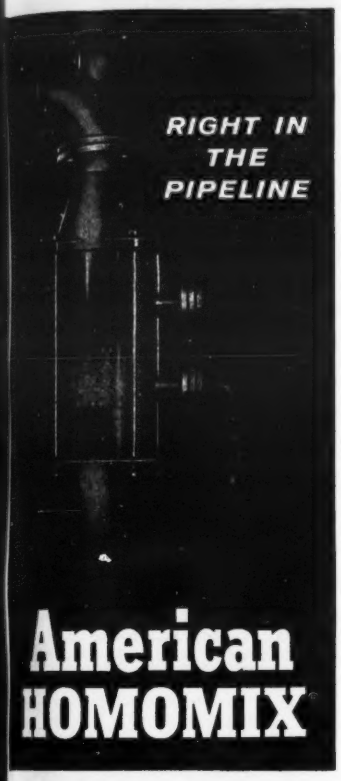
CONTINUOUS
LIQUID, GAS OR SLURRY
CHEMICAL MIXING



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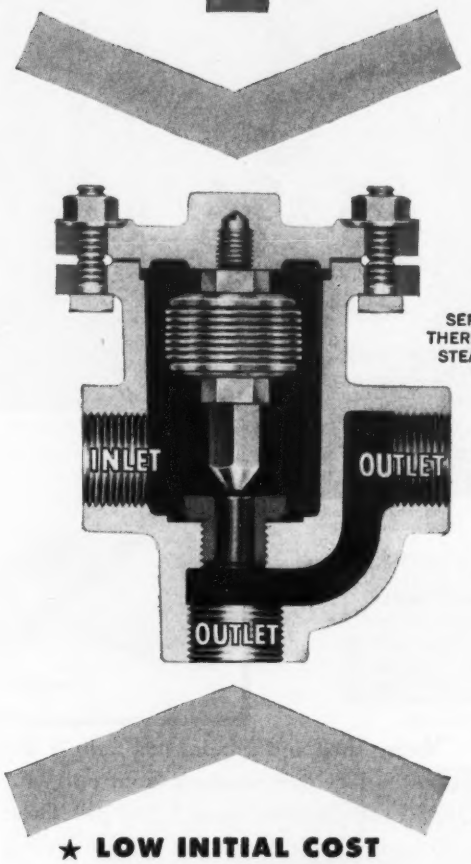

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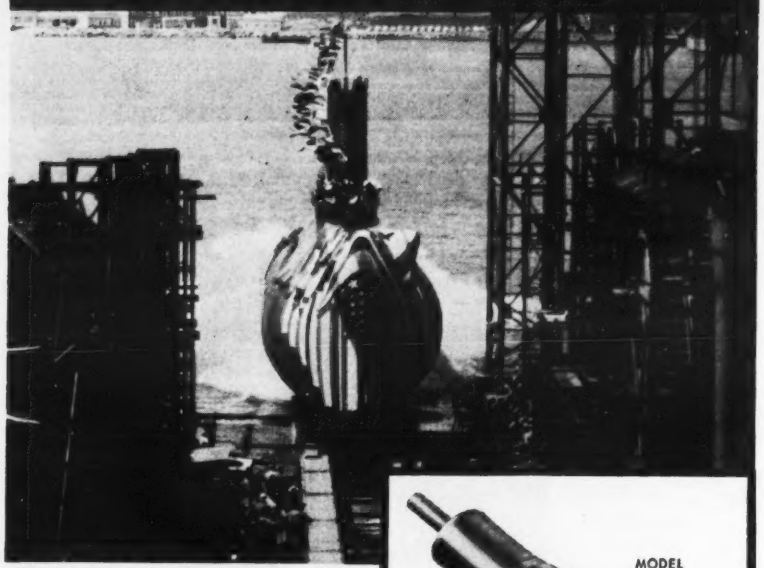

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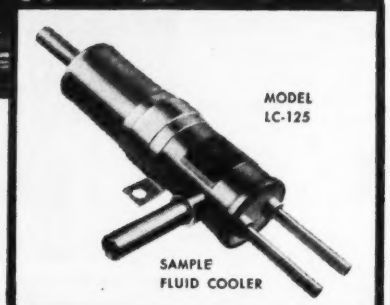

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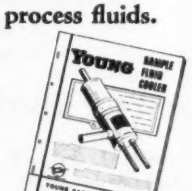

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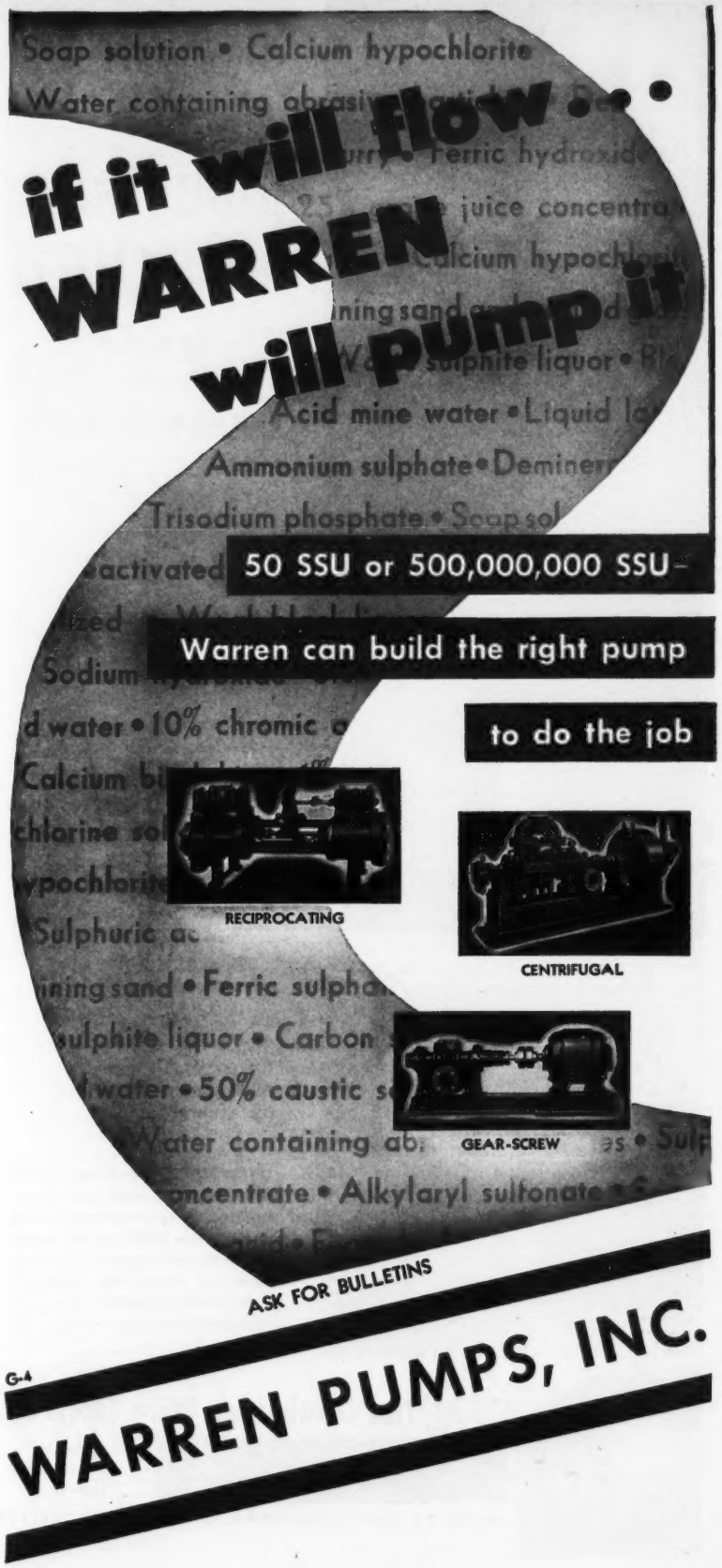

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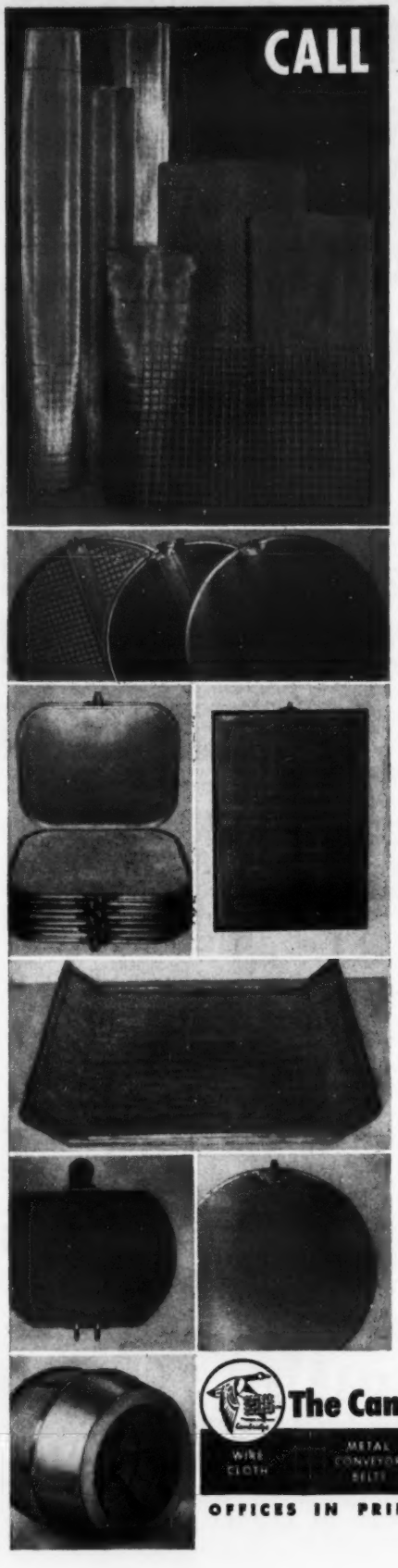

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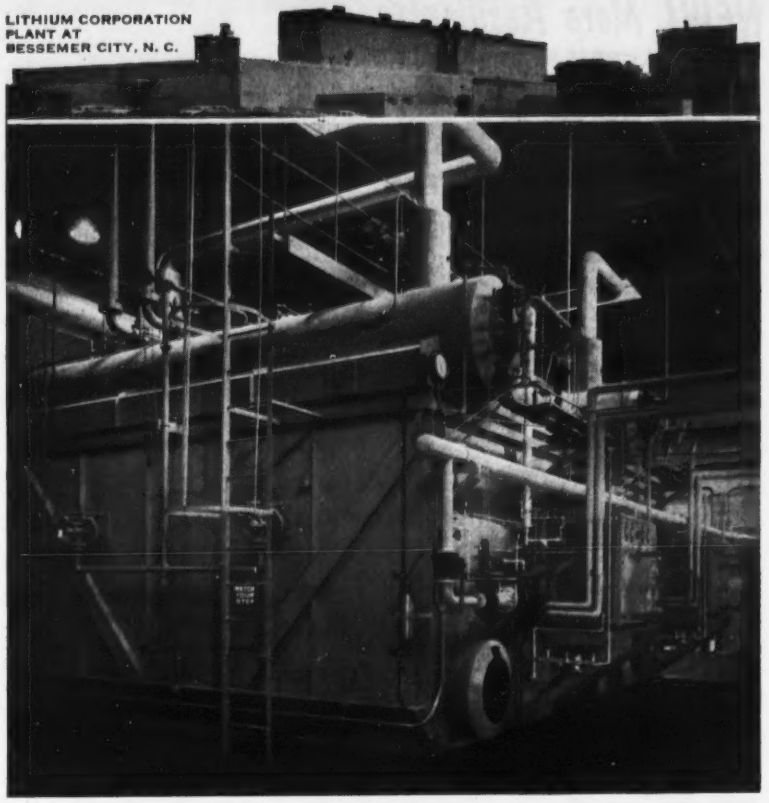

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☐	5633	Dicyclopentadiene
☐	5634a	Lithium Metal
☐	5634b	Lithium Metal Dispersions
☐	5634c	Lithium Metal Cartridges
☐	5634d	Lithium Chloride
☐	5634e	Lithium Fluoride
☐	5635	Odor Control
☐	5636	Micro-Silica
☐	5637	Vinyl Resins
☐	5638	Polymer Resins (state which)
☐	5639	Cellulose Ion-exchangers
☐	5640	Polyvinyl Acetate Emulsions
☐	5641	Teflon Flexible Tubing
☐	5642	Urea Formaldehyde Resins
☐	5643	Sucrose Derivative
☐	5644a	White Oils
☐	5644b	Petrolatum
☐	5644c	Petroleum Sulfonate
☐	5645	Aluminas
☐	5646	Plasticizers
☐	5647	Defoamer
☐	5648	Methacrylic Acid
☐	5649	Organic Chemicals
☐	5650	Ba-Cd Stabilizer
☐	5651	Sodium Phosphates
☐	5652	Silicone Defoamer
☐	5653	Epoxy Resin Curing Agent
☐	5654	Rare Earths
☐	5655	Flexibilizer
☐	5656	Accelerator
☐	5657	Lanolin Derivative
☐	5658	Coatings Solution Binder
☐	5659	Heat-reflective Plastic
☐	5660	Fermentation Chemistry
☐	5661	Filteraid
☐	5662a	Maleic Anhydride
☐	5662b	Phthalic Anhydride
☐	5662c	Fumaric Acid
☐	5662d	Industrial Chemicals (state which spec sheets)
☐	5663	Analytical Reagent
☐	5664	Lab Reagents
☐	5665	Anionic Surface-active Agent
☐	5666	Rocket & Missile Propellants
☐	5667	Purified Rare Earth & Yttrium Oxides
☐	5668	Cationic Agents
☐	5669	Acrylic Emulsion
☐	5670	Stearic Acid
☐	5671	Silicone Rubbers
☐	5672	Polymerized Ethyl Silicate
☐	5673a	Ethyl Alcohol
☐	5673b	Titanium Centrifuges
☐	5673c	Organosodium Compounds
☐	5673d	Polyethylene Containers
☐	5673e	Technical Developments (state number)
☐	5674	Fluorides
☐	5675	Carbon Dioxide
☐	5676	Inorganic Chemicals
☐	5677	Non-staining Antioxidant
☐	5678	Monomers
☐	5679	Surface-active
☐	5680a	Liquid Caustic Soda
☐	5680b	Flake & Solid Caustic Soda
☐	5680c	Phosphorous Oxychloride
☐	5680d	Phosphorous Trichloride
☐	5680e	Sodium Sulfhydrate
☐	5680f	Caustic Potash
☐	5680g	Sodium Sulfide
☐	5680h	Potassium Chlorate
☐	5680i	Potassium Perchlorate
☐	5680j	Sodium Chlorate
☐	5680k	Oxalic Acid
☐	5680l	New list of products
☐	5681	Surface-active Agents
☐	5682	Urethane Foam
☐	5683a	PE-based Alkyd Resins
☐	5683b	Ethylene Polymer
☐	5684	Textile Resin
☐	5685	Research and Development
☐	5686	Starches
☐	5687	Phenolic Compounds
☐	5688	Organic Chemicals
☐	5689	Pigment
☐	5690	Aromatic Chemicals
☐	5691	Petroleum Refining Catalyst
☐	5692	Aluminum Process Equipment
☐	5693a	Heat Exchanger Tubes
☐	5693b	Aluminum Pipe and Fittings
☐	5693c	Aluminum Steam-traced Pipe
☐	5694a	Aluminum Storage Tanks
☐	5694b	Shipping Containers
☐	5694c	Aluminum Industrial Building Products (see ad, state which)
☐	5695a	Aluminum Bus Bars
☐	5695b	Aluminum Stair Treads
☐	5695c	Aluminum Grating
☐	5695d	"Process Industries Book"
☐	5695e	Corrosion Engineering
☐	5696a	Magnetic Separators
☐	5696b	Vibratory Equipment
☐	5696c	Magnetic Drum
☐	5696d	Plate Magnet
☐	5696e	"Magnetic Ideas"
☐	5696f	Ferrotrap
☐	5697	Chemical Pumps
☐	5698	Corrugated Boxes
☐	5699	Stainless Steel Fittings
☐	5700	Tractor-dozer
☐	5701	Laboratory Equipment
☐	5702	Graphite Heat Exchanger
☐	5703	Gasketing Material
☐	5704	Protective Coatings
☐	5705	Metallo-organic Polymers
☐	5706	Polyethylene Blocks
☐	5707	Welding Electrodes
☐	5708a	Pushbutton Station
☐	5708b	Enclosed Pilot Lights
☐	5709	Cooling Cab
☐	5710	Valves
☐	5711	Executive Health Survey
☐	5712	Refractory Retainers
☐	5713	Chemical Motors
☐	5714	Mercury Pumps
☐	5715	de Nora Cells
☐	5716	Saran-lined Pipe, Fittings & Valves
☐	5717	Packless Diaphragm Valves
☐	5718	Corrosion-resistant Pump
☐	5719	Plastic Ducts
☐	5720	Stainless Steels
☐	5721	Protective Coatings
☐	5722	Stainless Tubing & Pipe
☐	5723	Metering Pump
☐	5724	Corrosion Inhibitor
☐	5725	Corrosion-resistant Valves
☐	5726	Plastic Coating
☐	5727	Glass-lined Pipe & Fittings
☐	5728	Stainless Steel
☐	5729	Stainless Valves
☐	5730	Mist Eliminators
☐	5731	Coating Applicator
☐	5733	Static Seal
☐	5734	Flexible-rigid Linings
☐	5735	PVC Pipe
☐	5736	Teflon-lined Steel Pipe
☐	5737	Flexible Polyamide Tube
☐	5738	Corrosion-resistant valves
☐	5739	Polyethylene Fabrications
☐	5740	Furnace Refractory
☐	5741a	Teflon Jacketed Gaskets
☐	5741b	Expansion Joints & Flexible Couplings
☐	5742	Corrosion-resistant Pipe & Fittings
☐	5743	PVC Check Valve
☐	5744	Teflon-lined Valves
☐	5745	Corrosion-resistant Coating
☐	5746	Ferrolite Floor Finish
☐	5747	Diaphragm Shields
☐	5748	Stainless Steel
☐	5749	Centrifugal Pumps
☐	5750	Air-conveying System
☐	5751	Electo Pumps
☐	5752a	Proportioning System
☐	5752b	Stack Bins

Be Sure To Give Your Address

See additional products and services on reverse side ——→

READER SERVICE SLIP SEPTEMBER 1957 (Continued)

✓	Key	Description
☐	5753	Ball Transfer
☐	5754	Vibrating Feeder
☐	5755	Bulk Conveyors
☐	5756	Steam-jacketed Valve
☐	5757	Air Conveyors
☐	5758	Plate Magnet
☐	5759	Palletless Handling
☐	5760	Self-dumping Hopper
☐	5761	Vibrating Dryer
☐	5762	Weighing Scales
☐	5763	Feeders
☐	5764	Vinyl Coating Process
☐	5765	Checkweigher
☐	5766	Fork Truck
☐	5767	Convertible Hand Truck
☐	5768	Dumpers
☐	5769	Drum Handling Equipment
☐	5770	Lift Trucks
☐	5771	Automatic Weighing Scales
☐	5772	Belt Conveyor
☐	5773	Hand-lift Trucks
☐	5774	Plug Valves
☐	5775	Nitrogen Gas Generator
☐	5776	Ductile Iron Pipe Fittings
☐	5777	Chemical Faucets
☐	5778a	Teflon Expansion Joints
☐	5778b	Flexible Couplings
☐	5778c	Teflon Accessories
☐	5779	Catalytic Mufflers
☐	5780	Toluene Diisocyanate Detectors
☐	5781	Exhausting Fan
☐	5782	Safety-step Ladders
☐	5783	Gas Detector
☐	5784	Power Roof Exhausters
☐	5785	Eyewash Fountain
☐	5786	Portable Fire Pump
☐	5787	Industrial Gloves
☐	5788	Alarms & Fire Detecting Systems
☐	5789	Electric Lanterns & Safety Cans
☐	5790	Marking Machines
☐	5791	Plastic Containers
☐	5792	Steel Drums & Containers
☐	5793	Bagging Scales
☐	5794	Box Car Loader
☐	5795	Bag Packer
☐	5796	Adhesives Additives
☐	5797	Box Stitching
☐	5798	Lined Steel Drums
☐	5799	Seamless Drums & Barrels
☐	5800	Case-forming Machine
☐	5801	Air & Electric Vibrators
☐	5802	Filling Machine
☐	5803	Aluminum Bottle Caps
☐	5804	Fiber Drums
☐	5805	Dust Collector
☐	5806	Water Filter
☐	5807a	Metallic Dispersion Dissolvers
☐	5807b	Processing Equipment Service
☐	5808	Mobile Mixer
☐	5809	Rotary Blender
☐	5810	Entrainment Separator
☐	5811	Reverse-jet Dust Collector
☐	5812	Air Separator
☐	5813	High Tension Separator
☐	5814	Ultrasonic Emulsifier
☐	5815	Lead-shielded Filter
☐	5816	Steam Tube Dryers
☐	5817	Ventilating Fans & Blowers
☐	5818a	Distillation Equipment
☐	5818b	Laboratory Still
☐	5819	PVC Valves & Fittings
☐	5820	Control System
☐	5821	Demineralizers
☐	5822a	Finned Condenser Tubes (state which)
☐	5822b	"Comparative Heat Exchanger Costs"
☐	5823	Drying Equipment
☐	5824	Filter Presses
☐	5825	Electric Furnace
☐	5826	Dust Collector
☐	5827a	Condenser Tubes
☐	5827b	Tube Sheet & Plates
☐	5828	Vibrating Screen Separator
☐	5829	Spray Dryer
☐	5830	Dust Collectors
☐	5831	Heat Transfer Units
☐	5832	Spray Nozzles
☐	5833	Entrainment Separators
☐	5834	Tube-type Cooler
☐	5835a	Corrosion-resistant Kettles
☐	5835b	Cooling & Vacuum Pans
☐	5835c	Equipment Processing
☐	5835d	Corrosion-resistant Tanks
☐	5836	Humidity Control System
☐	5837a	Mobile Centrifuge (state use)
☐	5837b	Centrifuge (state use)
☐	5838	Pulverizers & Dust Collectors
☐	5839	Particle Counters
☐	5840	Laboratory Furniture
☐	5841	Radiation Absorbers
☐	5842	pH Meters
☐	5843	Filter Systems
☐	5844	Fused Silica & Quartz Apparatus
☐	5845	Spray Nozzles
☐	5846	Water Conditioning Equipment
☐	5847	Rotary Pumps
☐	5848	Mass Spectrometer
☐	5849	Hydraulic Presses
☐	5850	High Vacuum Still
☐	5851	Vacuum Pump
☐	5852	Electrodeposition Analyzers
☐	5853	Lab Fire Alarm
☐	5854	Filters & Filtration Engineering
☐	5855	Vertical Leaf Pressure Filters
☐	5856	Batch-master Centrifugal
☐	5857	Power Transmission
☐	5858	Pressure Vessels & Process Equipment Fabrication
☐	5859	Corrosion-resistant Coatings
☐	5860	Hoist
☐	5861	Seal-less Centrifugal Pumps
☐	5862	Insulation Tester
☐	5863	Valves
☐	5864	Neoprene Gloves
☐	5865	Graphite Rupture Disk
☐	5866	Condenser and Heat Exchanger Tubes
☐	5867	Gas Mask
☐	5868	Portable Drum Elevators
☐	5869	Accumatic Lubricating System
☐	5870	Pipe & Tubing
☐	5871	Aluminum Vibrator
☐	5872	Brass Fittings
☐	5873	Ovens
☐	5874	Pumps
☐	5875	Diaphragm Valve
☐	5876	Polystyrene Insulation
☐	5877	Flexible Couplings
☐	5878	PVC Pipe, Fittings, Valves
☐	5879	Expansion Joints
☐	5880a	Hard-facing Alloys
☐	5880b	Spraywelder
☐	5881	Diaphragm Valves
☐	5882	Teflon Fabrications
☐	5883	Check Valves
☐	5884	Liquid Eye Indicators
☐	5885	Liquid Level Controllers
☐	5886	Self-cleaning Air-conditioner
☐	5887	Stainless Steel Meter-control System (see coupon)
☐	5888a	Dust Control Equipment
☐	5888b	Cyclonic Separators
☐	5888c	Dust Filter
☐	5888d	Exhaust Fans
☐	5889	Cellular Glass Insulation
☐	5890	Aluminum Jacketing
☐	5891	Welded-tube Condenser
☐	5892	Steam Traps
☐	5893	Pumps
☐	5894	Steel Alloy Pipe & Valves
☐	5895	Welding
☐	5896	Asbestos Fiber Gaskets
☐	5897	Molybdenum Tubing Extrusion
☐	5898	Heaters
☐	5899	Insulating Firebrick
☐	5900	Liquid Level Gages & Valves
☐	5901	Conveyor Dryers
☐	5902	Micronized Steel, Epoxy Resin Alloy
☐	5903	Dust Collection Systems
☐	5904	Corrosion-resistant Pumps
☐	5905	Stainless Steel Plug Valve
☐	5906	Filtering, Mixing, Storing Units
☐	5907	Flexible Metal Hose
☐	5908	Dust Collector
☐	5908a	Piston Rings
☐	5908b	Packings
☐	5910	Fire Hose
☐	5911	Isomerization Process
☐	5912	Vermiculite
☐	5913	Plastic-coated Steel Pipe
☐	5914	Pressure Filter
☐	5915	Carbon Graphite Bearing
☐	5916	Data Processing System
☐	5917	Work Positioners
☐	5918	Laboratory Equipment
☐	5919	Fire Protection Systems
☐	5920	Industrial Truck Batteries
☐	5921	Recirculating Ovens
☐	5922	Pinch-type Valves
☐	5923	Instrumentation Tapes
☐	5924	Bag Filling Machine
☐	5925	Ceramic Filters
☐	5926	Storage Rack
☐	5927	Forged Steel Fittings
☐	5928	Low-temperature Centrifugal
☐	5929	Percolation Adsorptive Processes
☐	5930	Proving Ring
☐	5931	Clad Metals
☐	5932	Self-sealing Pipe Fitting
☐	5933	Optical Instruments
☐	5934a	Tube Expander
☐	5934b	Tube Cleaners
☐	5934c	Tube Cutters
☐	5935	Package Classifier
☐	5936	Thermocouples
☐	5937	Vibration Analyzers
☐	5938	Valve and Pipe Fittings
☐	5939	Industrial Equipment
☐	5940a	Air Filters
☐	5940b	Air Regulator
☐	5940c	Lubricators
☐	5940d	Air Drain Trap
☐	5941	Quench Towers
☐	5942	Filter Cloth
☐	5943	Steel Belt Conveyors
☐	5944	Corrosion-resistant Pumps
☐	5945	Lubrication System
☐	5946	Humidity Chambers
☐	5947	Automatic Controls
☐	5948	Gaskets & Packings
☐	5949	Centrifugal Machines
☐	5950	Impressed Current Anodes
☐	5951	Air Filters
☐	5952	Petroleum Processing Plants
☐	5953	Conversion Table
☐	5954	Primary Amyl Alcohol
☐	5955	Pumps
☐	5956	Industrial Truck Batteries
☐	5957	Silicon
☐	5958	Water Treating
☐	5959	Tower Packing
☐	5960	Bag, Drum & Carton Liners
☐	5961	Acid-proof Channel Pipe
☐	5962	Valves
☐	5963	Wire Mesh Products
☐	5964	Variable Speed Drives
☐	5965	Synthetic Rubber Compound
☐	5966	Steam Analysis
☐	5967	Catalytic Purifiers
☐	5969	PVC Valves
☐	5970	Motor Graders
☐	5971	Continuous Digester
☐	5972	Ceramic Coatings
☐	5973	Magnetic Separator
☐	5974	Centrifugal Pump
☐	5975	Chart Printers
☐	5976	Welding Fittings
☐	5977	High-pressure Pumps
☐	5978	Chemical Feed Units
☐	5980	Jacketed Pipe & Fittings
☐	5981	Nickel-base Alloys
☐	5982	Zirconium
☐	5983	Acrylonitrile
☐	5984	Butyl Rubber
☐	5985	Valves
☐	5986	Solvent Recovery Systems
☐	5987	Manometers
☐	5988	Zirconium
☐	5989	Centrifugal Pumps
☐	5990	Aluminum
☐	5991	Totally-enclosed Motors
☐	5992	Insulating Tape
☐	5993	Roof Coatings
☐	5994	Solenoid Valves
☐	5995	Perforated Metal Screens
☐	5996	Compressors
☐	5997	Thermistors
☐	5998	Concrete Handling Conveyors
☐	5999	Bump Pump
☐	6000	Annunciators
☐	6001	Resistance Thermometers
☐	6002	Pumps
☐	6003	Centrifugal Pumps
☐	6004	Automatic Tank Gages
☐	6005a	Filter
☐	6005b	Utility Filter
☐	6005c	Disc Filter
☐	6005d	Asbestos Filter Sheet
☐	6005A	Irradiation Service
☐	6006	Surface-actives
☐	6007	Corrosion-resistant Fittings
☐	6008	Hand Pallet Truck
☐	6009	Jar Mills
☐	6010	Conveyor Furnaces
☐	6011	Flow Meters
☐	6012	Mechanical Seals
☐	6013	Asbestos Textiles
☐	6014	Heat Exchangers
☐	6015	Industrial Tractor
☐	6016	Viscometran
☐	6017	Concrete Floor Coatings
☐	6018a	Essential Oils
☐	6018b	Aromatic Chemicals
☐	6018c	Certified Colors
☐	6020	Dust Collector Cleaning
☐	6021	Engineering Aptitude
☐	6022	Plastic Pipe
☐	6023	Fire Protection System
☐	6024	Urethane
☐	6025	Air Valve
☐	6026	Pressure Filter
☐	6027a	Teflon Bellows
☐	6027b	Flexible Couplings
☐	6027c	Teflon-lined Expansion Joints
☐	6028	Automatic Centrifugal
☐	6029	Centrifugal Pumps
☐	6030	Rotary Batch Mixer
☐	6031	Pipe Joints Compound
☐	6032	Screw Conveyors
☐	6033	Specific-gravity Apparatus
☐	6034	Foam Machine
☐	6035	Coatings
☐	6036	Ventilator
☐	6037	Motor-starters
☐	6038	Drain Valves
☐	6039	Meter-relays
☐	6040	Car Unloaders
☐	6041	Mixers and Homogenizers
☐	6042	Chemical Feeders
☐	6043	Filters
☐	6044	Liquid Level Switch
☐	6045	Extruded Teflon Shapes
☐	6047	Condenser & Ejector
☐	6048	Vessel Linings
☐	6049	Dust Collectors
☐	6049A	Industrial Glassware
☐	6050a	Acid-proof Sump Pumps
☐	6050b	Vacuum-seal Pumps
☐	6051a	Time Recorder-totalizer
☐	6051b	Instruments
☐	6052	Pump Packing
☐	6053	Peptones
☐	6054a	Vacuum Pumps
☐	6054b	Compressors
☐	6055	Contour Retainer Mesh
☐	6056	Rotary Airlock Feeders
☐	6057	Aluminum Grating
☐	6058	Laboratory Glassware
☐	6059	Crane Scales
☐	6060	Pumps
☐	6061	Gas Generators
☐	6063	Gaskets, Shims & Washers
☐	6064	Filter Press
☐	6065	Liquid, Gas Slurry Pumps
☐	6066	Liquid Dispenser
☐	6067	Metal Gratings
☐	6068	Filter Leaves
☐	6069	Liquid-gas Separators
☐	6070	Corrosion-proof Floor
☐	6071	Elevator-conveyor
☐	6072	Drum Pumps
☐	6073a	Tanks
☐	6073b	Processing Equipment
☐	6074	Iron Bender
☐	6075	Rotary Lifts
☐	6076	Solenoid Valves
☐	6077	Manometers
☐	6078	Joint Sealer
☐	6079	Photoelectric Controls
☐	6080	Pyrometers
☐	6081	Pumps (state problem)
☐	6082	Pre-mixed Grout
☐	6083	Stainless Steel Tubing & Pipe
☐	6084	Chromatography
☐	6085a	Corrosion-proof Cements
☐	6085b	Corrosion-proof Linings
☐	6085c	Plastic Fabrications
☐	6086	Steam Generators
☐	6087	Temperature Controls
☐	6088	Thermostats
☐	6089a	Teflon "O" Rings
☐	6089b	Teflon Items
☐	6090	Rotary Air Pump & Motor
☐	6091	Rotary Pumps
☐	6092	Centrifugal Air Separators
☐	6093	Dispersall Mixer
☐	6094	Liquid Gages
☐	6095	Drum & Barrel Handling
☐	6096	Jacketed Pipe & Fittings
☐	6097	Micro-bellows Pump
☐	6098	Corrosion-resistant Coating
☐	6099	Dichlorophene
☐	6100	Mixers & Colloid Mills
☐	6101	Blenders
☐	6102	Preservatives
☐	6103	Disperser
☐	6104	Mixers
☐	6105	Sewerage Treatment Unit
☐	6106a	Thermostatic Traps
☐	6106b	Fluid Controls
☐	6107	Sample Fluid Cooler
☐	6108	Pumps
☐	6109	Wire Cloth & Fabrication
☐	6110	Packaged Boiler
☐	6111	Teflon Packing
☐	6112	Electronic Supplies
☐	6113	Concrete Floor Patch
☐	6114a	Dryers
☐	6114b	Coolers
☐	6114c	Calciners
☐	6114d	Kilns
☐	6115	Corrosion-resistant Coatings

Be Sure To Give Your Address

Please type or print and be sure to give your title and main product of company

Name _____ Title _____

Company _____ Main Product _____

Street Address of Company _____

City _____ Zone No. _____ State _____

Fill In . . . mail to READER SERVICE DEPT., CHEMICAL PROCESSING

This is an Editorial Service — No Obligation

111 East Delaware Place, Chicago 11, Illinois

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Please print or type

Name _____ Title _____

Company _____

Main Products _____

Rating of Company _____

Street Address of Company _____

City _____ Zone No. _____ State _____

*"substantial operations" does not necessarily mean an extremely large plant. But requests for the magazine exceed supply so we must set standards to insure publication being sent where it can be used to best advantage.

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Main Products _____

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Name _____ Title _____

Name _____ Title _____

Name _____ Title _____

Company _____

Main Products _____

Rating of Company _____

Street Address of Company _____

City _____ Zone No. _____ State _____

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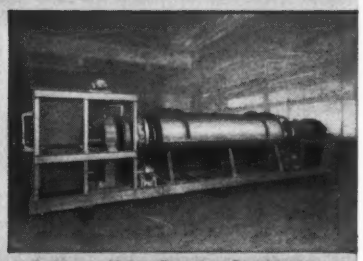

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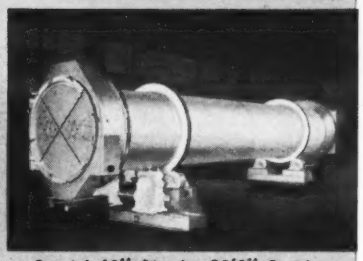

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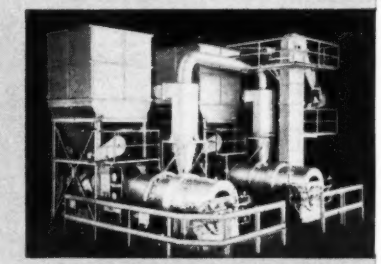
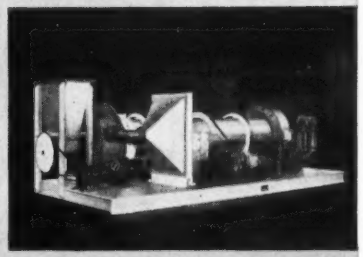


Two Completely Self-Contained Drying Systems Operated Singly or Together—Showing Materials Handling and Dust Collection Facilities.



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Whether the material you wish to process is light or heavy, fine or coarse, abrasive or corrosive, we can design and build the exact size and type of equipment best suited for your particular product and capacity requirements.

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For more information on product at right, specify 6114 see information request blank opposite last page.

CORROSION'S FOCAL POINTS are easy to detect with a new Amercoat testing method using iron and caustic indicators in a saline gelatin bath. On the welded and scored steel panels shown above after test, unworked surface areas turned red to indicate cathodic properties; but the weld, scores and edges turned blue (here shown blackened) to reveal themselves as anodic corrosion breeders. Rivets, threads, crevices and abrasions also show anodic under test. Unless such areas are effectively sealed from moisture, oxygen and ions they will erupt as focal points of corrosion cells.

How to protect "trouble spots" against corrosion

Ask a corrosion engineer where metal corrosion is likely to attack first. Chances are that he will name rivets, threads, sharp edges, angles, crevices and welds. These are the areas of stress concentration, work hardness, fissures and abrasions. They tend to be anodic and actually breed corrosion. And although they warrant increased protection, conventional coatings pull away from their sharp profiles and leave them inadequately covered.

Amercoat No. 87, a true vinyl mastic, protects these spots in a single coat 10 mils thick, whereas other coatings fail to build 5 mils in three coats. It cuts maintenance painting costs up to 50% because you don't have to re-erect staging and scaffolds for additional coats, and you get results that last.

No. 87 combines the time-tested chemical and weather resistance of vinyl coatings with the thickness of mastic, yet it is easily sprayed with standard equipment over a suitable primer. Available in white, gray, black and aluminum. Use it for enduring protection at lower cost per square foot per year. Complete details mailed on request.—Amercoat Corp., South Gate, Calif.

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